U4120-1-F

The U.S. Agricultural and Food System
A Postwar Historical Perspective

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Publication Number 55
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for Rural Development
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M. C. Hallberg*

Introduction

This report presents trends since 1950 in key variables and relationships relevant to the U.S. agricultural and food system. Its purpose, in part, is to provide insights into the development and character of this system, and into the events that have helped shape the system during the past nearly forty years. The report is also intended as a foundation for understanding the key relationships that will shape this sector today and tomorrow, and for assessing the likely consequences of changes in the variables of these relationships. If the scope of an historical analysis such as this is sufficiently broad and encompassing, it can help us visualize the whole picture more clearly than if it were to concentrate on isolated phenomena of the past. Thus a final hope is that this report will help the reader obtain a clearer perception of the totality of the system, and thus be guided toward more rational insights

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*Professor of Agricultural Economics at The Pennsylvania State University. I have distributed much of the data in this report to graduate students enrolled in a course on agricultural policy I have taught for the past several years. My aim has been to help students become more familiar with the setting in which policy for the agricultural and food sector evolves. I am grateful to the students in these classes who have forced me to sharpen my concepts, keep the data up to date, and develop new data series needed to better elucidate the issues. I am also grateful to Thomas A. Brewer, George L. Greaser, and Earl J. Partenheimer for their helpful comments and suggestions on an earlier draft of this report.

and conclusions concerning its workings and future. As such, the report should contribute to increasing our general understanding of the U.S. agricultural and food system. Such understanding is all the more important as we contemplate new legislation for the agricultural sector to replace the current farm legislation that is due to expire in 1990.

The report consists chiefly of tables containing data felt to be most appropriate to the above aims. In general, the data cover the 1950-1987 period. The primary focus of the report is on showing trends in these data rather than offering detailed interpretations or explanations. Hence, the brief discussion accompanying each table is intended only to highlight key trends or relationships.

Data Sources

The bulk of the data in this report are found in the following publications of the U.S. Department of Agriculture: Agricultural Statistics (various annual issues); Food Consumption, Prices, and Expenditures, Economic Research Service (various annual issues); Economic Indicators of the Farming Sector, Economic Research Service (various annual issues); and Agricultural Outlook, Economic Research Service (various monthly issues). Data on population, households, and money income of households are available in the U.S. Department of Commerce's Current Population Reports, Bureau of the Census (various annual issues) and Historical Statistics of the United States: Colonial Times to 1970, Bureau of the Census, Bicentennial Edition, 1975. A number of "Situation", "Outlook", and other special reports published by the Economic Research Service have been used to update data series in the above publications. **Most of the data recorded for 1987 are preliminary or projected and are subject to later revision.**

The tables include data for five-year intervals from 1950 to 1980. Beginning in 1980 data are given for each year to provide a clearer picture of the system in the more recent past.

Relative Importance of Agriculture in the National Economy

The proportion of our nation's income originating in primary agriculture, or farming, has declined steadily over the past four decades (Table 1). In fact, farmers' contribution to national income has been declining almost since the inception of this country!

In the initial stages of a country's development, farmers not only till the soil and tend their livestock in order to produce agricultural products, but they also provide their own inputs and process their surplus production for sale to nonfarmers. As the country's economy matures, specialized industries emerge to supply more and more of farmers' input needs, to process agricultural production, and to distribute food products to consumers. In addition, non-agricultural industries develop to employ the expanding labor force. Thus, as general economic development proceeds apace, the proportion of the national income generated by nonfarm sectors of the economy increases.

In the early stages of the development of America, primary agriculture was the dominant industry. By the turn of the nineteenth century, as development of lands West of the Atlantic Seaboard was just beginning, about seventy percent of the gainfully employed workers in this country were employed in farming, and about forty percent of the national income originated in farming. Today, however, only about three percent of gainfully employed workers in the United States are employed in primary agriculture, and less than two percent of the national income originates

Table 1. National Income Originating in Agriculture, Farm Population and Farm Households, Farm Employment, Capital Expenditures in Agriculture, and Number of Farms in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
National Income Originating in Agriculture														
Percent of National Income	7.2	4.6	3.9	3.3	2.8	3.2	2.5	2.8	2.4	1.9	1.7	1.7	1.7	1.6
National Income Originating per Worker in 1982 Dollars														
Agricultural Sector ($thou)	7.4	6.7	7.5	9.9	11.9	15.7	17.0	19.6	17.2	14.3	13.9	14.6	15.6	15.2
Total U.S. Economy ($thou)	17.3	19.7	20.6	23.5	24.6	24.9	25.5	25.6	25.3	25.9	26.8	27.0	27.3	27.5
Farm Population (mil)	23.0	19.1	15.6	12.4	9.7	8.9	6.1	5.9	5.6	5.8	5.8	5.4	5.2	5.0
Percent of U.S. Population	15.1	11.5	8.7	6.4	4.7	4.1	2.7	2.5	2.4	2.5	2.4	2.2	2.2	2.0
Rural Population (mil)	62.4	59.0	54.4	55.0	54.3	57.0	59.8	60.4	60.8	61.4	62.0	62.5	63.1	63.9
Percent of U.S. Population	41.0	35.6	30.1	28.3	26.5	26.4	26.3	26.3	26.2	26.2	26.2	26.2	26.2	26.2
Households														
Number of U.S. Households (mil)	43.6	47.9	52.8	57.4	63.4	71.2	80.8	80.4	82.6	83.5	84.3	86.0	87.5	88.8
Number of Farm Households (mil)	6.3	5.6	4.1	3.4	2.7	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2
Population per U.S. Household	3.5	3.5	3.4	3.4	3.2	3.0	2.8	2.9	2.8	2.8	2.8	2.8	2.8	2.7
Population per Farm Household	3.7	3.4	3.8	3.7	3.6	3.5	2.5	2.4	2.3	2.4	2.5	2.4	2.4	2.3
Farm Employment														
Total Farm Employment (mil)	9.9	8.4	7.1	5.6	4.5	4.3	3.7	3.6	3.6	3.5	3.5	3.4	3.2	3.2
Percent Hired Workers	23.5	24.3	26.7	26.4	26.0	30.3	35.2	36.2	37.2	38.2	39.2	40.0	40.0	37.4
Percent of Farm Population	43.1	43.9	45.1	45.4	46.6	49.0	61.2	62.2	63.6	60.8	60.1	62.8	60.5	64.3
Percent of U.S. Employment	16.8	13.5	10.7	7.9	5.7	5.1	3.7	3.6	3.6	3.5	3.3	3.1	2.9	2.9
Capital Expenditures on Building and Equipment														
Total Capital Expenses ($bil)	2.9	2.7	3.1	4.2	5.3	9.5	14.0	10.6	10.5	9.1	9.3	6.8	6.4	6.4
Percent of Total Pdn Expenses	24.0	18.7	16.4	18.1	16.4	17.8	14.8	11.7	10.7	9.9	9.7	7.9	7.9	8.0
Percent of Total Cash Receipts	16.4	14.1	13.1	15.5	14.4	15.0	14.1	11.5	10.5	10.2	9.8	7.3	7.1	7.2
Farms in the U.S. (thou)	5,648	4,654	3,963	3,356	2,949	2,521	2,433	2,434	2,401	2,370	2,328	2,275	2,212	2,160
Acres per Farm	213	258	297	340	374	420	427	425	428	432	438	446	456	461

in primary agriculture. Similarly, farm population has declined from fifteen percent of the U.S. population in 1950 to two percent in 1987 (Table 1). While primary agriculture is unquestionably an important sector supplying food to consumers at home and abroad, it is no longer the most important sector economically; no longer the hub of economic activity in this country.

The declining importance of primary agriculture in America could have serious consequences. For example, the decline in farm population in many areas appears to have put great strains on the rural community. Unless other opportunities are provided, nonfarm people in the rural community may be forced to leave as the number of farm service jobs decreases. Furthermore, as the number of farms decline (see Table 1) and as farms become more specialized, the density of production of enterprises typical of the remaining, smaller farms decreases. The lower production density threatens the existence of smaller farms as total production in the area falls below critical levels required to sustain markets and needed support services.

The declining importance of primary agriculture may also be expected to lead to difficulty in pushing legislation through Congress that is favorable to farmers. No one likes to be on a listing ship, for there may come a time when all hope is gone and the ship is abandoned. As will be shown, however, the "agricultural ship" has not yet been abandoned. Why? One reason is that much of the U.S. population still lives in rural areas, even though only about two percent of the population lives on farms. In 1950, over forty percent of the population was classified as rural. This figure dropped to around 26 percent by the mid 1960s and has remained at that level since that time (Table 1). In many areas, the rural population

depends heavily on the farm sector for its economic well-being. If farming were to cease in these areas, the rural community may have difficulty maintaining its current economic health, and the attractiveness of rural life may diminish. Hence it is easy to see why this portion of the population is generally very interested in seeking the support of legislation favorable to farmers. Furthermore, much of the urban population still sympathizes with farmers and supports legislation favorable to farmers who produce the food on which everyone depends.

Changes in Key Variables Have Occurred

The U.S. agricultural sector may not have been as resilient as some would like it to be, but it has made several significant adjustments. Table 1 shows that the number of farms has decreased by over one-half since 1950,[1/] and average farm size measured in acres has more than doubled. Further, as indicated before, farm population has declined from fifteen percent of the total U.S. population in 1950 to two percent in 1987. A similar reduction has occurred in the number of farm workers as a proportion of total U.S. employment. Capital, of course, has substituted for much of this labor, but here too the amount of capital expenditures on buildings and equipment has declined both absolutely and in relation to other expenditures (Table 1). In relation to total production expenses,

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[1/] The current definition of a farm is "any place that has $1,000 or more of gross sales of farm products per year." Prior to the 1978 Census, a farm was defined as "any place with less than ten acres from which $250 or more of agricultural products were sold or normally would have been sold during the census year, or any place of ten acres or more from which $50 or more of agricultural products were sold or normally would have been sold during the census year." This change in definition reduced markedly the number of farms in the United States following 1978.

capital expenditures on buildings and equipment showed a slight downward trend between 1950 and 1980, and a steep downward trend since 1980.

The number of farm households has declined at a rate consistent with the decline in farm population (Table 1). The size of farm families for many years was larger than that of nonfarm families. Since 1980, however, the size of farm households has been smaller than the size of nonfarm households. Surveys by the Bureau of the Census show that the median age of the farm population is now significantly higher than that of the nonfarm population (5.4 years higher in 1986). It is reasonable, then, to expect the family size of the farm population to be smaller than that of the nonfarm population.

Farm Size

On average, the size of U.S. farms as measured in acres has more than doubled since 1950 (Table 1). However, measuring farm size in acres can be somewhat misleading because of the differing intensities with which different agricultural enterprises use the land resource. For a clearer perspective, the distribution of farms by annual gross sales shown in Table 2 is helpful. In 1960, only 2.9 percent of the farms had annual cash sales of $40,000 or more, whereas today about 27 percent have annual cash sales of $40,000 or more. Further, the gross sales of farms with $40,000 or more accounted for 30.6 percent of total U.S. gross farm sales in 1960, but 85 percent in 1987!

There are also some significant problems associated with examining the farm size issue from the perspective of cash sales. First it is clear that $40,000 in 1960 is not the same as $40,000 in 1987. The effect of inflation must be taken into account. Unfortunately, our statistics are

Table 2. Numbers of Farms, Percentage Distribution of Gross Farm Sales, and Relative Earning Power of Farms by Sales Class in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Number of Farms by Sales Class as a Percent of All Farms in the United States														
Under $5,000	na	na	62.2	57.9	57.5	44.5	38.1	37.3	36.4	37.4	38.4	39.4	40.1	40.1
$5,000-$9,999	na	na	16.7	15.1	12.6	12.3	12.8	12.7	12.6	12.3	12.1	11.8	12.0	12.0
$10,000-$19,999	na	na	12.5	13.8	12.3	12.5	11.8	11.7	11.6	11.3	11.0	10.7	10.7	10.7
$20,000-$39,999	na	na	5.7	8.3	10.2	12.5	11.5	11.3	11.1	10.8	10.4	10.1	10.1	10.0
$40,000-$99,999	na	na	2.3	3.7	5.6	12.5	14.5	14.7	14.9	14.6	14.4	14.2	13.3	13.3
$100,000-$249,999 [a]	na	na	0.6	1.1	1.2	3.8	6.8	7.4	9.6	9.7	9.7	9.7	9.5	9.5
$250,000-$499,999	na	na	na	na	0.4	1.5	3.3	3.8	2.6	2.7	2.8	2.9	3.0	3.0
$500,000 and over	na	na	na	na	0.1	0.4	1.0	1.1	1.2	1.2	1.2	1.2	1.3	1.3
Percentage Distribution of Annual Gross Farm Sales by Sales Class														
Under $5,000	na	na	16.1	11.6	10.2	5.3	4.3	4.3	4.5	4.5	4.5	4.3	4.3	4.3
$5,000-$9,999	na	na	15.0	10.4	6.8	3.4	2.7	2.6	2.6	2.5	2.4	2.3	2.3	2.3
$10,000-19,999	na	na	20.6	17.6	12.1	6.1	3.9	3.7	3.5	3.4	3.3	3.1	3.1	3.1
$20,000-$39,999	na	na	17.7	19.6	18.7	11.4	6.7	6.2	6.0	5.7	5.4	5.4	5.4	5.3
$40,000-$99,999	na	na	14.6	17.9	20.7	24.1	17.9	16.8	16.6	16.2	15.7	15.8	14.6	14.6
$100,000-$249,999 [a]	na	na	16.0	23.0	10.1	15.8	18.2	18.6	23.7	24.1	24.0	24.3	23.2	23.0
$250,000-$499,999	na	na	na	na	7.7	13.1	18.9	20.2	14.3	15.0	15.4	16.2	16.2	16.6
$500,000 and over	na	na	na	na	13.7	20.7	27.5	27.5	28.9	28.7	29.3	28.5	31.0	30.8
Net Income per Farm from Farm Sources as a Percent of Mean Money Income per U.S. Household														
Under $5,000	na	na	19.5	15.9	-0.1	-4.4	-6.7	-6.2	-3.6	-4.9	-4.8	-4.5	-3.3	-2.8
$5,000-$9,999	na	na	59.3	45.6	22.8	3.9	-4.0	-4.7	-2.7	-5.1	-3.8	-1.9	-0.3	0.0
$10,000-$19,999	na	na	94.1	78.4	52.8	19.0	-4.0	-7.4	-5.6	-6.9	-7.1	-2.6	0.9	3.8
$20,000-$39,999	na	na	167.7	121.7	104.1	47.3	1.8	-5.3	1.6	-1.4	-3.5	9.5	15.9	18.8
$40,000-$99,999	na	na	255.1	214.8	198.4	124.3	28.6	11.2	22.9	18.7	12.7	36.6	47.0	42.8
$100,000-$249,999 [a]	na	na	556	469	401	302	121	88	102	101	97	135	146	129
$250,000-$499,999	na	na	na	na	917	712	331	272	337	342	328	403	404	311
$500,000 and over	na	na	na	na	6,317	4,383	2,444	2,059	1,834	1,704	1,963	2,080	2,066	1,611

[a] This sales class is $100,000 and over in 1960 and 1965.
na - Data not available.

not reported in such a way as to enable us to adjust for inflation. We can, however, gain a clearer perspective by comparing the earning power (net income per farm from farm sources) of different sized farms with the average money income of all families in the United States. The lower portion of Table 2 shows that in 1960 farms with annual cash sales of between $10,000 and $19,999 in 1960 netted, on average, nearly as much as the average money income of all U.S. households, whereas in 1987 farms in this sales category, on average, were not even in the ballpark! In fact, through most of the 1980s, net farm income for farms in this category was negative! On the other hand, farms in the $40,000 to $99,999 sales category netted an income well above the average money income of all U.S. households in 1960. In 1986-87, farms in this sales category netted, on average, slightly less than half as much as the average money income of all U.S. households.

Another difficulty associated with using sales categories to make inferences about changing farm sizes over time is that both technology and prices have changed considerably over the past nearly forty years, and at different rates for different commodities. Consider a dairy farmer milking fifty cows and deriving eighty percent of cash sales from the sale of milk. Assuming that in 1960 the cows produced at the national average rate of 6977 pounds of milk per cow and that the farmer's milk sold for the U.S. average price of $4.21 per cwt, this farm would have fallen into the $10,000 to $19,999 sales category. In 1987, on the other hand, assuming this farmer's cows produced at the 1987 national average of 13,786 pounds of milk per cow and that this milk sold for the U.S. average price of $12.54 per cwt, this farm would have fallen into the $100,000 to $249,999 sales category!

Consider next an Illinois grain farmer producing continuous corn on 260 acres of tillable land and deriving all farm income from corn. Assuming that in 1960 the farmer's land produced corn at the national average of 55 bushels per acre and sold for the national average price of $1.00 per bushel, this farm would also have fallen into the $10,000 to $19,999 sales class. In 1987, assuming this farmer's land yielded corn at the 1987 average of 119 bushels per acre and sold at the national average price of $1.56 per bushel, this farm would have fallen into the $40,000 to $99,999 sales class!

The point is that what was a relatively large farm in terms of gross sales by 1960 standards cannot begin to support a family by today's standards. Today a farm must have annual sales of $100,000 or more to sustain a family at the level of the average U.S. household. Furthermore, not all farms have grown larger in terms of physical size (animal units or acres), as might be suggested by a cursory examination of the data; some have merely moved to different sales categories over the years as both productivity and nominal prices have increased. Some people argue that midsized family farms are disappearing from agriculture, resulting in a "bimodal" distribution of farms; many small, many large, and few in between. The truth is that many of the midsized family farms of the past have merely moved into the larger sales categories as prices and productivity have increased. The most significant change in their character has been increased annual cash sales; they are still midsized family farms!

Farm Income

Income of the farm population can be measured in a variety of ways, all of which have their special problems. We have constructed a measure of the money income of farm households and compared this measure with the average money income of all U.S. households as shown in Table 3. Money income of farm households includes income from both farm and nonfarm sources.[2/] It excludes all nonmoney income: the value of food produced and consumed on the farm, changes in the value of inventories, and estimated rental value of farm dwellings. When expressed per farm household, this income measure is then directly comparable to the average money income of all U.S. households as estimated by the U.S. Department of Commerce, Bureau of the Census.

These comparisons are made only for the purpose of examining the relative trends in money incomes of the two population groups. This is not to suggest that money income of the farm population is equivalent dollar-for-dollar to money income of the nonfarm population. Indeed, it might be argued that farm people receive other benefits that nonfarm people do not, so that these money income figures are in fact not directly comparable. Other benefits include psychic benefits associated with owning one's own land and residing in rural areas, economic returns associated with spending less time and money getting to and from work,

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[2/] A consistent estimate of off-farm income of farm families is only available starting in 1960. For the 1950-59, period off-farm income of farm families is estimated on the basis of the Personal Income series, 1934-79, reported in U.S. Department of Agriculture. Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1979. Economics and Statistics Service, Statistical Bulletin No. 650. December 1980.

Table 3. Money Income and Off-Farm Income of Farm Families in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Money Income of Farm and of All U.S. Households														
Farm Households ($thou) [a]	2.5	2.6	3.9	6.4	10.3	15.7	18.4	17.4	19.6	19.8	21.8	28.9	33.7	39.2
All U.S. Households ($thou)	3.7	4.6	5.4	7.0	10.0	13.8	21.1	22.8	24.3	25.4	27.5	29.1	30.8	32.0
Farm as % of U.S. Households	68.0	55.1	72.5	90.2	102.5	113.9	87.5	76.4	80.6	78.1	79.4	99.4	109.7	122.4
Farm as % of All U.S. Households, excluding Government Payments	66.8	54.2	69.3	79.8	88.9	111.6	85.0	72.9	74.7	62.7	66.2	87.7	92.4	98.2
Farm as % of All U.S. Households, excluding Government Payments and Off-Farm Income	39.3	28.9	31.1	25.9	24.2	42.8	17.3	8.4	12.2	1.2	6.3	23.4	26.7	28.7
Off-Farm Income of Farm Families as a Percent of Aggregate Farm Income and Government Payments [b]														
Total Net Income ($bil)	19.9	17.8	19.7	25.6	32.0	49.4	50.8	62.7	60.0	49.7	70.3	74.9	82.2	94.0
Off-Farm as % of Total	31.6	36.5	43.1	49.7	55.1	48.3	68.3	57.1	60.8	74.5	54.5	56.8	54.4	51.1
Net Income per Farm from Off-Farm Sources as a Percent of Net Income per Farm from All Sources by Sales Class														
Under $5,000	na	na	70.4	79.8	100.1	105.3	108.9	108.6	104.9	106.9	106.9	105.7	104.0	103.2
$5,000-$9,999	na	na	32.9	50.2	70.6	95.0	105.4	106.6	103.7	107.4	105.5	103.7	100.5	100.0
$10,000-$19,999	na	na	19.8	29.6	44.3	75.1	106.1	112.3	109.2	111.7	112.7	104.8	98.5	94.9
$20,000-$39,999	na	na	15.6	22.6	24.5	47.2	96.7	111.4	97.0	102.8	107.4	85.8	74.4	74.8
$40,000-$99,999	na	na	11.6	19.6	16.7	22.9	59.4	77.9	62.3	66.1	73.2	57.2	48.8	53.2
$100,000-$249,999 [c]	na	na	0.0	18.0	16.0	14.7	26.6	32.2	28.5	28.3	28.1	24.2	22.0	25.6
$250,000-$499,999	na	na	na	na	0.0	8.6	13.6	15.1	12.0	11.3	10.7	10.3	9.7	13.1
$500,000 and over	na	na	na	na	0.0	2.0	3.7	3.8	3.7	3.5	2.8	3.3	4.1	5.3

[a] Net farm income plus off-farm income (estimated for 1950-59) less the value of commodities produced and consumed on the farm, rental value of farm dwellings, and net change in farm inventories.

[b] This item includes money and nonmoney income.

[c] This sales class is $100,000 and over in 1960 and 1965.

na - Data not available.

benefits from having access to more home-produced food than do nonfarm families, benefits from paying less rent for housing, etc.

The comparisons indicate that money income of farm households was relatively low in the 1950s and early 1960s. Through the 1970s, money income of farm households exceeded or nearly equaled that of the general population (Table 3). During the early 1980s, money income of farm households fell below that of the general population but recovered again by 1985. Farm households' average money income was well above that of the general population in 1973-75 and again in 1987. The early 1980s, on the other hand, were relatively bad years for farm households compared with all households in the U.S.

We know that farm income is much more variable than nonfarm income because of the riskiness of the farming occupation. We also know that the distribution of income is more skewed in the farming business than in other occupations and that there is a greater incidence of poverty (as measured by annual money income) in agriculture than in other occupations. Nevertheless, the gap between average money incomes of farm and nonfarm households has narrowed considerably since the 1950s and 1960s.

Government payments to farmers have certainly assisted many farm families, but in general they have not been significant in narrowing the gap between farm and nonfarm incomes (see Table 3). Off-farm income of farm families has been a significant factor (see Table 3). Off-farm income has constituted over fifty percent of farm family income (money and nonmoney) since 1970! In some years, off-farm income has approached seventy percent of total farm income. The distribution of off-farm income by farms in different sales classes shows that most of the off-farm income

is earned by families on small farms. It is interesting to note, however, that even on the farms that we generally consider of commercial size (i.e., those with annual cash sales of $100,000 to $249,999), off-farm income constituted close to or slightly more than 25 percent of aggregate net farm income in most of the years since 1975.

The crucial importance of off-farm income to most farm families has significant implications for the rural community. If nonfarm jobs are not available, these farm families will not be able to remain in farming. In many cases it may be surmised that if the farms do not survive, neither will the rural community since it depends not only on the demand of farmers for market outlets, farm inputs, and services, but also on farm families for surplus labor needed to staff local businesses.

Cash or money income is one measure of the relative well-being of farm families. Wealth is another. On the basis of wealth, we must conclude that farm families are in a superior position! According to a recent USDA report, the "wealth of farm operator households averaged about $225,000 in 1986. The average wealth of U.S. households in 1984 was $78,739. The wealth of farm operator households is greater than the wealth of U.S. households at all levels of income."[3/]

Farm Ownership and Tenancy

About 55 percent of the farms in the United States are operated by full owners, but only slightly more than one-third of the acreage is

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3/ U.S. Department of Agriculture. Economic Indicators of the Farm Sector: Farm Sector Review, 1986. Economic Research Service, ECIFS 6-3, p. 52. January 1988.

operated by full owners (Table 4). These percentages have remained fairly stable since 1950. Apparently a higher percentage of small farms are operated by full owners. Indeed, based on a 1979 USDA farm survey[4/] nearly 75 percent of the land operated by farmers with annual cash sales of less than $20,000 was owned by these operators.

Table 4. Farm Ownership and Tenancy in the United States, 1950-82.

	1950	1954	1959	1964	1969	1974	1978	1982
	- - - - - - - - - - Percent- - - - - - - - - -							
Farms Operated by:								
Full Owners	57.4	57.2	57.1	57.6	62.5	61.5	57.5	59.2
Part Owners	15.3	17.9	21.9	24.8	24.6	27.2	30.2	29.3
Full Tenants	29.6	24.4	20.5	17.1	12.9	11.3	12.3	11.6
Farm Acres Operated by:								
Full Owners	36.1	34.2	30.8	28.7	35.3	35.3	32.7	34.7
Part Owners	36.4	40.7	44.8	48.0	51.8	52.6	55.3	53.8
Full Tenants	18.3	16.6	14.9	13.1	13.0	12.0	12.0	11.5

Part owners now operate about thirty percent of the farms and about 55 percent of farm acreage. The percentage of farms and of farm acreage operated by part owners has steadily increased. The relative importance of full tenants has diminished; they now operate only about twelve percent of the farms and twelve percent of the farm acreage. Many full tenants have transferred out of agriculture or become part owners.

Consistent data on the form of business organization in farming is available only from the last two censuses, so precise information on

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[4/] Robert F. Boxley. "Farmland Ownership and the Distribution of Land Earnings." Agricultural Economic Research. 37:4:40-44. Fall 1985.

trends here is unavailable. In 1982, however, 87 percent of the 2.2 million farms were operated by individuals or families, ten percent by partnerships, and about three percent by corporations. Of the slightly more than one billion farm acres, 65 percent were operated by individuals or families, fifteen percent by partnerships, and thirteen percent by corporations. (Another seven percent of the farm acres were operated by a small number of other business forms, including agricultural cooperatives and government or institutional units.)

Acres Planted and Enterprise Mix

A growing total population in the United States has bid away some cropland acreage from the farming sector, but the decline in farm acreage since 1950 has been surprisingly small--only about seventeen percent over the 38-year period (Table 5). The proportion of farm acreage planted to crops and harvested has remained quite stable over the period. The proportion of acreage devoted to wheat and the major feed grains has changed very little since 1950. Oat production has declined since less of this commodity has been needed for animal feed. Cotton production has declined slightly over the period as the demand for cotton has decreased. Soybean production increased significantly in the early years of the period under study as the demand for protein feed increased and soybeans became a more popular crop. Of those crops not shown in Table 5, harvested acreages of sugar, tobacco, and peanuts are about equal and about one-half as large as rice acreage. Sugar acreage (beet plus cane) has increased only slightly; tobacco acreage has decreased by about one-half; and peanut acreage has remained quite stable since 1950.

Table 5. Number of Farms, Farm Acreage, Harvested Acreage, and Cash Receipts from Selected Farm Enterprises in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Farms in the U.S. (thou)	5,648	4,654	3,963	3,356	2,949	2,521	2,433	2,434	2,401	2,370	2,328	2,275	2,212	2,160
Acres per Farm	213	258	297	340	374	420	427	425	428	432	438	446	456	461
Farm Acreage														
Total Farm Acreage (mil)	1,202	1,202	1,176	1,140	1,102	1,059	1,039	1,034	1,028	1,024	1,019	1,014	1,008	996
Percent Harvested	28.0	27.6	26.9	25.5	26.2	31.4	33.9	35.4	35.2	29.9	34.1	33.7	32.3	29.5
Harvested Acreage of Selected Crops as a Percent of Total Harvested Acreage														
Wheat	18.3	14.2	16.4	17.0	15.1	20.9	20.2	22.1	21.5	20.1	19.2	18.9	18.7	19.0
Corn	21.5	20.6	22.7	19.0	19.9	20.3	20.7	20.4	20.1	16.8	20.7	22.0	21.3	20.2
Oats	11.7	11.8	8.4	6.4	6.4	3.9	2.4	2.6	2.9	3.0	2.4	2.4	2.1	2.4
Barley	3.3	4.4	4.4	3.2	3.4	2.6	2.0	2.5	2.5	3.2	3.2	3.4	3.7	3.4
Sorghum	3.1	3.9	4.9	4.5	4.7	4.6	3.6	3.7	3.9	3.3	4.4	4.9	4.3	3.6
Soybeans	4.1	5.6	7.5	11.8	14.6	16.1	19.3	18.1	19.2	20.4	19.0	18.0	18.2	19.2
Rice	0.5	0.6	0.5	0.6	0.6	0.8	0.9	1.0	0.9	0.7	0.8	0.7	0.7	0.8
Cotton	5.3	5.1	4.8	4.7	3.9	2.6	3.8	3.8	2.7	2.4	3.0	3.0	2.6	3.4
Cash Receipts from Farming														
Total Cash Receipts ($bil)	28.5	29.5	34.2	39.4	50.5	88.9	139.7	141.6	142.6	136.6	142.3	144.2	135.2	136.5
Percent from Hogs	11.3	9.1	8.4	9.2	8.9	8.9	6.4	6.9	7.5	7.2	6.8	6.3	7.2	7.3
Percent from Beef	19.9	17.8	21.5	22.7	27.0	19.7	22.5	20.9	20.9	21.0	21.5	20.2	21.4	22.0
Percent from Dairy	13.1	14.3	13.9	12.8	12.9	11.2	11.7	12.8	12.8	13.7	12.6	12.5	13.2	13.0
Percent from Poultry	3.3	3.6	3.3	3.3	3.1	3.4	3.2	3.4	3.2	3.7	4.3	4.0	5.1	4.5
Percent from Eggs	5.5	6.0	5.1	4.5	4.2	3.2	2.3	2.6	2.4	2.5	2.9	2.3	2.6	2.3
Percent from Feed Grains	7.5	8.7	8.7	9.4	10.1	13.7	13.1	12.5	12.2	12.2	11.1	15.6	13.2	9.6
Percent from Food Grains	6.8	6.7	7.2	5.2	5.0	9.2	7.4	8.2	8.0	7.1	6.7	6.3	4.4	4.0
Percent from Wheat	7.2	6.3	6.9	4.5	3.6	8.5	6.3	7.0	6.9	6.4	6.0	5.5	3.8	3.9
Percent from Oil Crops	3.3	3.8	4.0	5.5	7.1	8.4	11.1	9.8	9.6	9.9	9.8	8.8	7.8	7.9
Percent from Soybeans	2.6	2.8	3.5	5.5	6.4	8.6	10.2	8.6	8.8	8.9	8.6	7.8	6.8	7.1
Percent from Fruits and Nuts	4.2	4.3	4.5	4.2	4.1	4.0	4.7	4.7	4.8	4.4	4.8	4.7	5.1	5.7
Percent from Vegetables	5.0	5.7	5.8	6.7	5.6	6.0	5.2	6.2	5.7	6.2	6.4	5.9	6.4	6.7
Percent from Tobacco	3.7	4.2	3.4	3.0	2.7	2.4	1.9	2.3	2.3	2.0	2.0	1.9	1.4	1.3
Percent from Cotton	8.6	8.7	6.9	5.9	2.5	2.6	3.2	2.9	3.1	2.7	2.3	2.6	2.2	2.9
Percent from Crops	43.4	45.9	44.6	44.4	41.5	51.5	51.3	51.2	50.7	49.2	48.7	51.6	47.1	44.7
Percent from Livestock	56.6	54.1	55.4	55.6	58.5	48.5	48.7	48.8	49.3	50.8	51.3	48.4	52.9	55.3

The proportion of total cash receipts from farming derived from the various farm enterprises is shown in the lower portion of Table 5. The relative stability in the percentages over the 38-year period is remarkable. In some cases (hogs, eggs, tobacco, and cotton), noticeable but small declines are evident, while in other cases (poultry, feed grains, and oil-crops) small increases are noted. But for most enterprises the changes in relative importance are quite small or non-existent over the period.

Farm Assets, Debts, and Expenses

The asset and debt position of farmers and the importance of different expense items are shown in Table 6. The increase in the debt-asset and debt-equity ratios, the increase in interest rates, and the declining value of land leading to an erosion of loan security values, all since 1970, highlight why several farmers have had financial difficulties in recent years. Debt-asset ratios by sales classes have only recently been tabulated. These tabulations show that debt rises directly with sales volume. Debt-asset ratios by sales class in 1986 (the latest year for which such data are available) were as follows:[5/]

5/ U. S. Department of Agriculture. Economic Indicators of the Farm Sector: National Financial Summary, 1986. Economic Research Service. ECIFS 6-2. December 1987.

Table 6. Farm Assets, Farm Debts, and Farm Expenses in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Assets, Debts, and Value of Farm Land														
Total Farm Assets ($bil)	153	173	211	260	324	577	1,102	1,104	1,066	1,051	950	847	789	812
Assets per Farm ($)	27	37	53	78	110	229	453	453	444	443	408	372	357	376
Farm Debt-Asset Ratio (percent)	8.0	9.9	11.8	15.1	16.3	15.9	16.2	17.7	19.0	19.7	21.5	22.2	21.1	18.7
Farm Debt-Equity Ratio (percent)	8.7	11.0	13.4	17.9	19.4	18.9	19.3	21.5	23.5	24.4	27.5	28.4	27.8	23.9
Value of Farm Land ($ per acre)	53	66	92	126	167	335	707	713	685	680	591	519	476	502
Prime Rate of Interest	2.1	3.2	4.8	4.5	7.9	7.9	15.3	18.9	14.9	10.8	12.0	9.9	8.3	8.2
Aggregate Net Farm Income and Expenses as a Percent of Gross Cash Farm Income														
Net Income	41.2	33.8	29.1	27.7	24.4	25.4	10.8	16.2	14.4	8.3	18.3	19.5	23.5	27.2
Total Production Expenses	58.8	66.2	70.9	72.3	75.6	74.6	89.2	83.8	85.6	91.7	81.7	80.5	76.5	72.8
Fertilizer Expenses	2.9	3.5	3.5	4.3	4.1	6.6	6.4	5.7	4.9	4.6	4.3	4.4	3.6	3.2
Pesticide Expenses	0.5	0.6	0.8	1.0	1.6	1.8	2.4	2.5	2.6	2.7	2.7	2.9	2.7	2.7
Labor Expenses	8.5	7.8	7.9	7.7	7.4	5.9	6.2	5.4	6.2	6.4	5.6	5.9	6.2	6.4
Feed Expenses	9.9	11.6	11.8	12.2	13.6	12.8	14.0	12.5	11.4	14.2	11.4	10.9	10.1	9.5
Livestock Expenses	6.1	4.6	6.5	6.3	7.4	4.9	7.1	5.4	5.9	5.8	5.4	5.4	6.0	7.0
Depreciation Expenses	8.1	11.1	11.2	11.0	11.7	12.3	14.4	14.2	14.9	15.6	13.2	12.6	11.9	10.4
Machine Repairs	3.5	4.4	4.5	3.3	3.2	3.4	3.5	3.2	2.8	3.1	2.8	2.9	3.0	2.8
Building Repairs	1.9	2.2	2.0	1.8	1.6	1.1	1.3	1.0	1.1	1.1	0.9	0.9	1.0	1.0
Fuel and Oil	3.6	4.2	3.8	3.4	2.9	3.3	5.3	5.2	4.8	4.9	4.1	4.0	3.0	2.6
Electricity Expenses	0.2	0.4	0.5	0.5	0.5	0.6	1.0	1.1	1.2	1.4	1.2	1.3	1.3	1.4
Interest	1.8	2.5	3.5	4.5	5.7	6.3	10.9	11.9	13.4	14.0	12.1	11.3	10.6	9.0
New Building Expenses [a]	4.6	4.1	4.4	4.1	4.0	4.7	4.7	3.6	3.3	2.9	2.7	1.9	2.0	1.9
Machine and Equipment Purchases	4.3	3.8	3.8	4.8	4.9	4.8	4.7	2.8	3.1	3.1	2.7	2.2	2.0	1.9

[a] New construction, additions, and major improvements to existing buildings.

Sales Class	Debt-Asset Ratio
	(percent)
Under $5,000	19.5
$5,000-$9,999	12.1
$10,000-$19,999	14.3
$20,000-$39,999	16.1
$40,000-$99,999	19.9
$100,000-$249,999	22.8
$250,000-$499,999	25.0
$500,000 and over	37.1

The relative importance of different expense items has not changed greatly over the years since 1950, but the significance of some of the items has. Interest expense is now a much greater portion of the total. Depreciation has also increased in importance as depreciable assets have increased. Collectively, nonfarm-produced inputs now constitute a higher proportion of total expenditures than do farm-produced inputs. The margin farmers receive (as measured, roughly, by the percentage that net farm income is of gross farm income) is now much lower than in the 1950s. This is not necessarily an unhealthy situation, nor a justification for increased public support. It does suggest, however, that if sales volumes on the nation's farms had not increased over this period, family incomes on these farms would have been well below 1950 levels.

Prices Received, Prices Paid, and Price Instability

Table 7 shows the market prices of the major farm commodities deflated by the Consumer Price Index, and the index of prices paid for farm inputs deflated by the same Index. Here we see that real prices of all farm commodities have declined, by as much as one-half or nearly so for oats, sorghum, soybeans, peanuts, steers, lamb, and milk, and, at the

Table 7. Real Prices of Selected Agricultural Commodities and Real Prices Paid by Farmers in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Prices Received by Farmers, deflated by CPI (1967=100)														
Wheat ($/bu)	2.77	2.47	1.96	1.43	1.14	2.21	1.58	1.35	1.19	1.18	1.09	0.99	0.83	0.75
Corn ($/bu)	2.11	1.68	1.13	1.23	1.14	1.58	1.09	0.91	0.88	1.08	0.85	0.77	0.60	0.46
Oats ($/bu)	1.10	0.75	0.68	0.66	0.53	0.91	0.73	0.69	0.52	0.54	0.54	0.38	0.37	0.46
Barley ($/bu)	1.65	1.15	0.95	1.08	0.83	1.50	1.15	0.91	0.75	0.83	0.74	0.61	0.49	0.47
Rye ($/bu)	1.82	1.32	0.99	1.04	0.85	1.46	1.07	1.10	0.83	0.73	0.67	0.64	0.45	0.44
Sorghum ($/bu)	1.46	1.22	0.95	1.04	0.98	1.47	1.89	1.73	1.38	1.64	1.33	1.23	0.95	0.75
Soybeans ($/bu)	3.43	2.77	2.40	2.69	2.45	3.05	3.07	2.23	1.98	2.62	1.88	1.68	1.52	1.49
Cotton (cents/lb)	55.5	39.9	33.8	22.2	18.9	31.6	30.1	24.6	20.4	22.1	18.5	17.4	16.7	17.5
Rice ($/cwt)	7.06	6.00	5.13	5.22	4.45	6.28	4.50	4.37	2.89	2.78	2.67	2.09	1.53	1.32
Sugarbeets ($/ton)	16	14	13	13	13	17	19	11	12	12	11	10	10	10
Peanuts (cents/lb)	15.1	14.6	11.3	12.1	11.0	12.2	10.2	9.9	8.7	8.3	9.0	7.6	8.7	8.0
Tobacco, Burley (cents/lb)	71.7	66.3	68.7	68.9	62.7	63.6	61.7	62.6	61.0	59.7	58.1	51.1	46.4	45.6
Potatoes ($/cwt)	2.08	2.21	2.25	2.68	1.90	2.78	1.94	1.99	1.54	1.95	1.83	1.22	1.53	1.31
Choice Steers ($/cwt)	40.06	27.63	28.39	26.58	25.25	27.67	27.13	23.44	22.24	20.90	21.00	18.12	17.59	18.99
Choice Veal Calves ($/cwt)	44.38	32.42	32.69	29.63	38.69	24.81	30.60	28.33	26.88	24.45	20.56	18.09	18.25	23.15
Lamb ($/cwt)	38.18	23.54	20.18	24.13	22.70	26.12	25.73	20.15	18.37	18.06	19.32	21.14	21.04	22.90
Barrows and Gilts ($/cwt)	25.55	18.94	17.99	22.54	18.87	29.98	16.22	16.32	19.18	15.99	15.71	13.90	15.59	15.19
Wool (cents/lb)	86.1	53.4	47.4	49.8	30.5	27.7	35.7	34.7	23.7	20.5	25.6	19.6	20.3	27.0
Broilers (cents/lb)	38.0	31.4	19.1	15.9	11.7	16.3	11.2	10.5	9.3	9.8	10.7	9.3	10.5	8.4
Turkeys (cents/lb)	35.4	33.7	28.6	23.5	19.4	21.6	16.2	14.0	13.7	12.7	15.7	14.6	13.5	10.1
Eggs (cents/dozen)	50.3	49.3	40.6	35.7	33.6	32.5	22.8	23.2	20.6	20.5	23.2	17.7	18.6	15.8
Milk, Fluid ($/cwt)	6.05	5.61	5.29	4.90	5.20	5.60	5.36	5.12	4.77	4.61	4.37	4.00	3.84	3.72
All Apples (cents/lb)	4.4	4.7	5.4	4.6	3.9	4.0	3.5	4.1	3.5	3.5	3.6	5.4	5.8	5.9
All Grapes ($/ton)	94	54	61	48	81	88	97	109	80	67	61	53	65	65
All Lemons ($/box)	4.98	3.48	2.16	3.50	4.17	2.39	3.29	1.77	1.47	1.47	1.90	2.02	3.62	3.38
All Oranges ($/box)	3.11	2.41	3.10	3.33	1.80	1.71	1.97	1.95	2.29	1.96	2.47	2.85	1.85	2.20
All Pecans (cents/lb)	39.9	40.9	34.9	18.9	33.5	24.7	31.6	20.0	23.3	19.7	20.0	21.1	21.9	16.6
Indices of Prices Received and Prices Paid (1977=100), deflated by CPI (1967=100)														
All Commodities	77.7	63.6	58.6	57.1	51.6	62.7	48.6	51.0	46.0	45.2	45.6	39.7	37.5	37.3
All Crops	74.9	67.3	58.6	57.1	44.7	65.1	51.1	49.2	41.9	42.9	44.7	37.2	32.6	31.2
All Livestock	80.4	61.1	59.8	57.1	57.6	60.8	57.9	52.5	50.2	47.3	46.9	42.2	42.0	42.9
Prices Paid	51.3	49.9	49.6	49.7	47.3	55.2	55.9	55.1	54.3	54.0	52.7	50.6	48.4	47.6
CPI (1967=100)	72	80	89	95	116	161	247	272	289	298	311	322	328	340

other extreme, by one-fourth for wheat, corn, rice, and broilers. Real prices paid, on the other hand, have decreased slightly, if at all, and in fact were higher during the 1970s and early 1980s than in the 1950s and 1960s. As will become clear below, there has been much variability in farm prices since 1950. Nevertheless, the data in Table 7 point out that farmers have been facing a seemingly never-ending price-cost squeeze since 1950.

Trends in indices of selected prices received, prices paid, the parity ratio, and ratios of animal prices to feed prices are shown in Table 8. The latter ratios are most interesting for what they tell us about the profitability of animal feeding over time. The hog-corn price ratio, for example, indicates the number of bushels of corn needed to buy 100 pounds of live pork; the broiler-grower feed price ratio indicates the number of pounds of broiler-grower feed needed to buy one pound of live broiler; and the egg-layer feed price ratio indicates the number of pounds of layer feed needed to buy one dozen fresh eggs. When these ratios are high, the indicated animal production is more attractive to farmers. In the case of hogs, beef, and lambs, these ratios vary considerably, in fact, in a cyclical fashion. This tendency is much less evident in the poultry industries because of the shorter growing period. In the case of milk, the milk-feed price ratio varied hardly at all over the 1950-87 period.

Some interesting lessons can be learned by examining the variability of prices over the 1950-87 period (Table 9). Since supply and demand for most agricultural commodities are both highly price-inelastic (that is, large price changes are accompanied by very small if any change in quantity), at least in the short-run, small shifts in either of these two

Table 8. Indices of Prices Received and Prices Paid, and Ratios of Animal Product to Feed Prices in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Index of Prices Received by Farmers (1977=100)														
Crops	54	54	52	54	52	105	126	134	121	128	139	120	107	106
Livestock	58	49	53	54	67	98	143	143	145	141	146	136	138	146
All Commodities	56	51	52	54	60	101	120	139	133	135	142	128	123	127
Index of Prices Paid by Farmers (1977=100)														
Labor	22	27	33	38	57	85	126	137	144	148	151	154	160	167
Feed	53	54	49	53	54	101	124	134	122	134	135	116	108	103
Fertilizer	52	56	55	55	49	120	134	144	144	137	143	135	124	118
Fuel and Energy	41	45	48	49	51	88	188	212	209	201	201	201	162	161
Tractors and Combines	25	29	34	39	49	82	136	152	165	174	181	178	174	174
All Inputs	37	40	44	47	55	89	138	150	157	161	164	163	159	162
Prices Recd/Prices Pd (1977=100)	151	128	118	115	109	113	87	93	85	84	87	79	77	78
Parity Ratio (1910-14=100)	101	84	80	76	72	76	65	61	56	56	57	53	51	52
CPI (1967=100)	72	80	89	95	116	161	247	272	289	298	311	322	328	340
Ratios of Output-to Input Prices														
Hog-Corn Price Ratio	12.1	11.3	16.0	18.4	16.5	19.0	14.8	18.0	21.7	14.9	18.6	18.0	26.1	33.1
Steer-Corn Price Ratio	19.0	16.4	25.2	21.7	22.1	17.6	24.8	25.8	25.2	19.4	24.8	23.4	29.5	41.4
Lamb-Corn Price Ratio	18.1	14.0	17.9	19.7	19.8	16.6	23.5	22.2	20.8	16.8	22.9	27.3	35.3	49.9
Broiler-Grower Feed Price Ratio	6.2	5.2	3.6	3.3	2.9	3.2	2.7	2.5	2.6	2.6	2.9	3.0	3.7	3.5
Turkey-Grower Feed Price Ratio	8.8	8.3	7.7	5.1	5.0	4.0	3.6	3.1	3.3	3.0	3.9	4.5	4.1	3.5
Egg-Layer Feed Price Ratio	10.3	11.0	10.9	8.1	9.3	7.0	6.1	6.0	6.2	6.0	6.9	6.2	7.0	6.8
Milk-Dairy Feed Price Ratio	1.3	1.3	1.5	1.4	1.5	1.3	1.5	1.4	1.5	1.5	1.4	1.5	1.6	1.6

Table 9. Indices of Variability for Producer or Wholesale Prices of Selected Agricultural and Nonagricultural Commodities in the United States, 1950-87 [a].

Commodity	Years Included in Calculated Index			
	1950-59	1960-69	1970-79	1980-87
Supported Agricultural Commodities				
Wheat	3.9	10.3	34.7	4.4
Rice	6.7	3.0	31.7	8.7
Corn	4.2	5.9	25.4	15.5
Oats	6.5	4.1	24.4	12.2
Barley	7.2	7.0	28.4	7.4
Rye	10.3	5.2	26.2	8.1
Grain Sorghum	13.2	5.8	21.7	11.3
Soybeans	5.5	6.5	16.3	12.2
Cotton	5.5	8.6	13.0	6.6
Subarbeets	3.3	4.5	36.1	12.3
Peanuts	6.3	2.3	4.6	5.5
All Tobacco	3.0	6.2	4.0	6.8
Wool	20.1	10.4	30.6	17.2
Fluid Milk	5.8	5.4	4.9	2.7
Honey	4.6	4.0	16.3	3.2
Nonsupported Agricultural Commodities				
Potatoes	28.4	26.6	25.6	13.0
Choice Steers	15.3	6.6	12.4	4.5
Choice Veal Calves	16.9	7.7	21.4	11.3
Lamb	14.8	6.4	9.7	10.1
Barrows and Gilts	14.3	11.3	17.3	9.0
Broilers	6.6	6.2	14.1	7.4
Turkeys	4.6	8.3	14.0	11.9
Eggs	10.3	7.3	14.4	9.3
Snap Beans	5.3	2.4	12.0	3.2
Processing Tomatoes	6.8	9.4	12.7	3.6
All Apples	17.7	14.2	13.1	15.0
All Grapes	20.2	11.6	15.4	14.3
All Lemons	13.3	16.8	20.5	36.2
All Oranges	19.5	24.1	21.3	14.4
All Pecans	22.3	26.8	20.6	12.2
Nonagricultural Commodities				
Crude Oil	2.6	1.5	17.1	19.0
Bituminous Coal	4.4	4.2	10.0	4.1
Douglas Fir	23.6	25.6	31.3	46.1
Copper, electrolytic	17.4	7.4	12.1	12.9
Tin	10.5	11.5	35.8	10.3

[a] Indexes estimated from detrended data.

schedules will lead to quite sizable changes in price. This situation, coupled with the fact that agricultural output is quite sensitive to the vagaries of nature, leads many people to assume that prices of agricultural commodities will be highly variable.

Indices of variation for prices of various agricultural and nonagricultural commodities for each of four time periods since 1950 are shown in Table 9. These indices were computed after extracting a straight-line trend from the price data so that the resulting coefficients would not be biased by trend.[6/] Relatively short time periods were used so that changes in variability over time could be observed. This procedure has the obvious disadvantage of giving undue weight to a year in which a quite large price change occurred. This possibility was judged not to be a major problem for the commodities analyzed here, and the additional information gained from the use of short time periods was deemed to outweigh the costs. It will be observed also that particularly turbulent periods (the early to mid-1970s and the 1980s) are confined to one time period rather than being spread over two periods.

[6/] The coefficients were calculated as 100 times the square root of

$$\frac{\Sigma_1^n[(p_i - \hat{p}_i)^2 \div \hat{p}_i]}{(n-1)}$$

where n is the number of observations in the time series on p, and $\hat{p}_i$ is the estimated value of p_i based on a regression of p on a variable representing time. If all of the p_i lie on the regression line, the coefficient so computed is zero, indicating no variability about the trend line. If there is no trend so that $\hat{p}_i = \bar{p}$ for all i, then the coefficient so computed is equal to the coefficient of variation calculated as shown in any standard statistics text.

The first lesson to be learned from these data is that agricultural commodities are characterized by considerable price variability. Most commodities experienced greater levels of price variability during the period of food and energy shortages (the 1970s) and its aftermath. This variability was true of both supported and nonsupported commodities, although less so for the latter. Interestingly enough, even though farm policy has been in effect continuously over this entire period for wheat, rice, feed grains, cotton, wool, and honey, prices of these commodities have not been stable. On the other hand, prices of tobacco, peanuts, and milk have remained relatively stable throughout the entire 1950-87 period. The stability of the latter commodities can undoubtedly be attributed to their effective isolation from foreign competition and/or very tight controls on price and production.

A second lesson to be learned from these data is that a number of agricultural producers are operating successfully in the face of considerable price variability but without price and income support or protection from foreign competition. Consider, for example, the price variability for potatoes, apples, hogs, and all the fruits included in Table 9! (Marketing orders for lemons and oranges help to stabilize seasonal prices. These orders, however, do not use price supports buttressed with government purchases nor supply control to stabilize annual fruit prices.) Furthermore, some industries have managed to maintain reasonably stable prices on their own, for example, the broiler, egg, tomato, and snap bean industries.

A final lesson to be learned from Table 9 is that agriculture is not the only industry subject to price variability. Note in particular the indices of variability for douglas fir and, to a lesser extent, for tin shown in Table 9.

Table 10. Farm Output and Farm Inputs Used in United States Agriculture, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Index of Quantity of Farm Output (1977=100)														
Crops	59	63	72	76	77	93	92	118	122	94	119	130	130	130
Livestock	70	79	82	89	99	95	110	111	105	110	108	111	108	100
All Farm Products	61	69	76	82	84	95	98	121	121	101	119	129	128	130
Index of Quantity of Farm Inputs (1977=100)														
Farm Labor	265	220	177	144	112	106	96	96	93	97	92	85	80	78
Fertilizers and Pesticides	19	26	32	49	75	83	123	129	118	105	121	121	109	100
Power and Machinery	72	83	83	80	85	96	101	98	92	89	85	81	76	74
Taxes and Interest	83	89	95	101	102	100	100	99	92	97	88	91	91	90
All Farm Inputs	101	102	98	96	97	97	103	102	99	97	95	92	87	85
Hours of Farmwork per Acre Planted	55	45	39	34	27	22	19	18	18	22	18	17	17	17
Commercial Fertilizer and Lime Use per Acre Planted (lbs)														
Nitrogen	6	11	17	31	51	52	64	66	61	59	64	67	64	63
Phosphate	11	13	16	24	31	27	31	30	27	27	28	27	25	26
Potash	6	11	13	19	28	27	35	35	31	31	34	32	31	32
Liming Materials	169	117	139	189	177	187	193	163	130	164	154	152	152	158
Wheel and Crawler Tractors per 100 Acres Planted														
Number of Tractors	1.0	1.2	1.4	1.6	1.6	1.3	1.3	1.3	1.3	1.5	1.4	1.4	1.4	1.5
Horsepower	26	36	47	59	69	67	85	84	85	100	90	91	95	102

Agricultural Output, Farm Input Use, and Agricultural Productivity

Table 10 shows the trends in quantities of farm output and quantities of key farm inputs since 1950. Among other trends, this table highlights the steep decline in labor use and the corresponding steep increase in machinery and fertilizer and other chemical use. The total number of tractors and crawlers has not changed significantly between 1950 and 1987. Total tractor horsepower used, however, has nearly quadrupled since 1950.

Fertilizer use indicated in Table 10 deserves special consideration. Per acre use of nitrogen has increased tenfold and per acre use of potash has increased fivefold since 1950. Per acre use of phosphate has also increased, but on a much less dramatic scale; about two and one-half times since 1950. Increased fertilizer use has resulted in substantial crop yield increases (see Table 11) and thus in lower food costs to consumers. At the same time, however, significant amounts of water pollution have accompanied the increased use of fertilizers. Indeed this is an issue that must and will get increased attention from policy makers in the years ahead.

Table 11 shows the trends in various measures of agricultural productivity since 1950. People fed per farm worker has increased from a mere fifteen in 1950 to almost 76 in 1987. "People fed per farm worker" is often used as a summary measure of the tremendous growth in agricultural productivity. It is, of course, simply another measure of the rapid rate of decline of farm workers relative to the total population. Nevertheless, it does indicate much about the productive capability of farm workers over time.

Table 11. Crop and Animal Yields and General Productivity Measures in United States Agriculture, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
People Fed/Farm Worker	15.3	19.8	25.6	34.6	45.3	49.7	61.3	63.1	64.8	66.6	68.3	70.9	76.2	75.9
Crop and Animal Yields														
Wheat (bu/acre)	17	20	26	27	31	31	34	34	35	39	39	37	34	38
Corn (bu/acre)	38	42	55	74	72	87	91	109	113	81	107	118	119	119
Oats (bu/acre)	35	38	43	50	49	49	53	54	56	52	58	64	56	54
Barley (bu/acre)	27	28	31	43	43	44	50	53	57	52	53	51	51	53
Sorghum (bu/acre)	23	19	40	52	50	49	46	64	59	49	56	67	68	70
Soybeans (bu/acre)	22	20	23	25	27	29	26	30	32	26	28	34	33	34
Rice (cwt/acre)	237	306	342	426	462	456	441	482	471	460	499	542	565	548
Cotton (lbs/acre)	269	417	447	527	439	453	401	541	587	513	600	631	548	706
Milk Pdn (lbs/cow)	5,242	5,772	6,977	8,089	9,669	10,279	11,938	12,260	12,334	12,643	12,193	12,994	13,260	13,786
Egg Pdn (eggs/layer)	172	192	209	218	218	232	242	243	243	247	245	247	247	247
General Productivity Measures (Ratios of Indices, 1977=100)														
All Output/All Inputs	60	68	78	85	87	98	95	119	122	104	125	140	147	153
All Output/Land Input	56	64	74	80	80	98	95	116	119	100	123	136	138	144
All Output/Labor Input	23	31	43	57	75	90	102	126	130	104	129	152	160	167
All Output/Chemical Input	321	265	238	167	112	114	80	94	103	96	98	107	117	130
All Output/Power-Machine Input	85	83	92	103	99	99	97	123	132	113	140	159	168	176
Crop Output/Labor Input	22	29	41	53	69	88	96	123	131	97	129	153	163	167
Crop Output/Power-Machine Input	82	76	87	95	91	97	91	120	133	106	140	160	171	176
Crop Output/Chemical Input	311	242	225	155	103	112	75	91	103	90	98	107	119	130
Animal Output/Labor Input	26	36	46	62	88	90	115	116	113	113	117	131	135	128
Animal Output/Power-Machine Input	97	95	99	111	116	99	109	113	114	124	127	137	142	135

Crop and animal yields give more evidence on the productive capability of agriculture over time. Some of the more dramatic trends shown in Table 11 relate to crop and animal yields. In every case yields are up significantly. The greatest yield increases have been observed in corn production and milk production (and we have not even begun commercial use of bovine somatotropin, the laboratory-produced hormone that stimulates milk production). Rather large yield increases have been observed in sorghum and cotton production as well. Many have looked at the new research area referred to as "biotechnology" as something that will revolutionize agriculture and cause huge agricultural adjustment problems. It might well be said, however, that a technological revolution in agriculture is nothing new, nor are adjustment problems associated with technological change!

A second piece of information revealed by this table concerns the relative usage of different farm inputs. Most of the output-to-input ratios shown here exhibit a strong upward trend, indicating increasing productivity of the inputs. Notice, however, that in the case of chemicals and power and machinery, the ratios vary considerably. As we shall see from the data in Table 12, one reason for this variability is the variability in relative prices of inputs.

Input Prices and Input Use

Table 12 highlights the substitution of inputs in agricultural production as well as the incentives for input substitution. As was indicated previously, the land input in agriculture has remained fairly constant since 1950 while labor use has declined. Thus, the steady

Table 12. Ratios of Quantities of Farm Inputs and Ratios of Prices of Farm Inputs in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Ratios of Input Quantities (Ratios of Indices, 1977=100)														
Land/Labor	41	49	58	72	94	92	107	108	110	104	105	112	116	115
Power-Machine/Labor	27	38	47	56	76	91	105	102	99	92	92	95	95	95
Chemicals/Labor	7	12	18	34	67	78	128	134	127	108	132	142	136	128
Chemicals/Land	17	24	31	48	71	86	119	124	116	104	125	127	117	111
Chemicals/Power-Machine	26	31	39	61	88	86	122	132	128	118	142	149	143	135
Power-Machine/Land	66	77	81	78	81	99	98	94	90	88	88	85	82	82
Ratios of Input Prices (Ratios of Indices, 1977=100)														
Land/Labor	61	62	69	80	68	88	123	113	103	99	84	72	63	63
Tractors/Labor	114	107	103	103	86	96	108	111	115	118	120	116	109	104
Chemicals/Labor	236	207	167	145	86	141	106	105	100	93	95	88	78	71
Chemicals/Land	390	334	242	181	126	160	87	93	97	93	113	122	122	112
Chemicals/Tractors	208	193	162	141	100	146	99	95	87	79	79	76	71	68
Tractors/Land	188	173	149	129	126	110	88	98	111	119	142	160	172	165

increase in the ratio of land to labor use since 1950 should not be surprising. It is also well-known that chemical and machine use in agriculture has increased quite rapidly (at the expense of labor) through the 1950s, 1960s, and 1970s. Therefore, the increase in the remaining ratios of input usage (Table 12) should not be surprising either. The quite large output to chemical input ratios shown for the 1950s and 1960s are simply a reflection of the fact that there was relatively little use of herbicides, pesticides, insecticides, and commercial fertilizer during these years.

These substitutions in inputs were in large part influenced by the corresponding changes in their prices. If, for example, the ratio of machine prices to wage rates is falling, then machinery prices are rising less rapidly than are labor prices. (Or machinery prices could be falling more rapidly than labor prices, but this conclusion is inconsistent with the facts.) This situation encourages farmers to substitute the relatively less expensive machines for the relatively more expensive labor--precisely what has happened in agriculture, at least through the 1970s. The remaining ratios shown in Table 12 should be interpreted in a similar fashion.

Notice that during the 1980s, unusual things began happening to some of the output-input ratios shown. Most of the price ratios shown began to turn down; some appear to have oscillated a bit. In response, farmers' substitution of machinery and chemical inputs for labor also slowed down. Of particular significance is the fact that farmers' substitution of machinery for labor has stabilized, and maybe even declined a bit, through the 1980s. If this trend continues, we can expect the demand for farm machines to remain quite weak, and to see the growth in size of farms to

slow down. If farmers refuse to buy more and bigger machines, they are not likely to be able to farm larger acreages. Thus, farm sizes will stabilize in spite of considerable speculation to the contrary. Indeed, judging from the trend in "acres per farm" shown in Table 1, one must conclude that growth in farm size has slowed markedly since 1975.

Agricultural Exports and Imports

A most significant development of the 1970s was the growth in exports of U.S. agricultural products. The value of agricultural exports as a percent of cash receipts from farm marketings increased from slightly more than ten percent in 1950 to nearly thirty percent in 1980-81 (Table 13). Foreign demand for food outstripped foreign supply, making food-importing countries increasingly dependent on the United States as residual supplier. Since the early 1980s, however, the situation has changed significantly. Since 1980, there has been a relative decline in the value of exports of two of our principal agricultural export commodities, wheat and feed grains, as world prices fell, and, more importantly, as other regions of the world (most notably the European Economic Community) have increased production of these commodities.

The mix of agricultural commodity exports has changed considerably over the years since 1950. The value of wheat and feed grain exports at first increased, but over the last eight or so years have declined as a proportion of the total. The value of animal and oilseed products have taken up much of the slack. Exports of dairy products (never a significant part of the total) have declined slightly as more of the world demand for dairy products has been satisfied by countries with a greater

Table 13. Agricultural Exports, Agricultural Imports, and Trade Balances in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Agricultural Exports														
Quantity Index (1967=100)	27	27	45	55	60	83	140	134	139	128	120	109	118	120
Value of Ag. Exports ($bil)	3.0	3.1	4.5	6.3	7.4	21.9	40.5	43.8	39.1	34.8	38.0	31.2	26.3	27.9
As % of Total U.S. Exports	29.6	21.1	23.6	23.8	17.4	20.4	19.2	19.1	18.1	17.9	18.3	14.8	13.0	12.2
As % of Cash Farm Receipts	10.5	10.7	13.2	16.0	14.6	24.6	29.0	30.9	27.4	25.5	26.7	21.6	19.5	20.4
% Wheat	15.6	15.4	22.8	19.1	15.4	24.5	16.4	18.4	19.6	17.7	17.1	13.7	12.4	10.3
% Animal Products	10.6	19.7	12.4	12.1	11.5	7.7	9.3	8.9	9.6	9.8	10.3	12.1	15.1	16.5
% Vegetables and Products	2.4	3.5	3.3	2.6	3.1	2.5	2.4	3.3	3.7	2.8	2.6	3.0	3.8	4.2
% Fruits and Products	3.0	4.8	4.5	4.3	3.9	2.6	2.7	2.9	3.0	3.3	2.8	5.4	6.7	7.4
% Feed Grains	8.3	11.2	12.1	18.4	14.8	24.2	24.3	24.0	18.0	18.7	21.6	22.1	14.5	13.4
% Oilseeds	2.3	6.3	8.1	11.2	17.3	20.4	23.2	21.5	24.9	25.1	22.6	19.9	23.8	22.6
% Soybeans	0.8	4.2	6.2	9.0	11.1	13.1	14.5	13.7	16.6	16.9	15.1	12.4	15.9	15.0
% Dairy	3.6	4.1	2.0	2.6	1.5	0.6	0.4	0.6	1.0	1.0	1.0	1.3	1.6	1.8
% Cotton	31.3	11.8	20.7	9.3	4.8	4.5	7.1	5.1	5.5	4.9	6.3	6.2	2.6	5.1
% Tobacco	9.1	12.1	8.5	6.2	7.6	3.9	3.3	3.1	3.8	4.3	3.8	5.1	5.0	4.3
Agricultural Imports														
Quantity Index (1967=100)	62	54	66	64	79	83	106	107	105	111	115	116	117	115
Value of Ag. Imports ($bil)	3.2	3.8	4.0	4.0	5.6	9.6	17.3	17.2	15.5	16.3	18.9	19.7	20.9	20.6
As a % of Total U.S. Imports	45.2	36.3	25.9	18.5	14.0	9.8	7.2	6.8	6.2	6.6	6.0	5.9	5.7	5.3
As a % of Ag. Exports	106.4	120.3	88.7	63.2	75.8	43.8	42.7	39.3	39.6	46.8	49.7	63.3	79.4	74.1
% Animal Products	3.1	4.0	7.8	10.7	18.1	11.0	13.2	12.9	13.1	12.9	10.2	11.2	10.8	13.5
% Vegetables and Products	2.3	1.8	2.5	3.7	5.1	3.9	4.9	6.0	7.2	6.4	6.9	6.8	7.5	7.3
% Fruits and Products	1.1	1.1	1.7	2.5	2.6	2.6	3.3	4.0	5.7	6.4	7.0	9.6	9.5	10.6
% Coffee	43.2	38.4	25.2	27.0	19.6	12.8	24.1	16.3	16.9	17.4	17.4	16.4	21.1	15.7
% Sugar	14.2	13.0	13.8	12.0	13.5	28.8	10.7	14.0	8.9	7.6	6.0	4.6	3.1	2.4
% Complements [a]	68.7	64.0	47.5	46.2	38.6	28.8	42.6	34.4	34.2	24.5	25.3	25.2	29.2	23.6
% Dairy	1.5	1.1	1.4	1.5	2.0	2.2	2.7	3.0	4.3	4.4	4.0	3.9	3.8	4.1
Dairy Imports as % of Milk Pdn	0.4	0.4	0.5	0.7	1.6	1.4	1.6	1.8	1.8	1.9	2.0	1.9	1.9	1.7
Trade Balances														
U.S. Trade Balance ($bil)	3.1	4.5	3.6	5.0	2.6	9.0	-30.6	-25.5	-33.4	-52.8	-108.6	-123.2	-160.8	-160.2
Ag. Trade Balance ($bil)	-0.2	-0.6	0.5	2.3	1.8	12.3	23.2	26.6	23.6	18.5	19.1	11.5	5.4	7.2

[a] Complementary products consist primarily of rubber, coffee, raw silk, cacao beans, wool for carpets, bananas, tea, spices, and vegetable fibers.

comparative advantage for milk production and by countries in the European Economic Community and Asia have increased their milk support prices encouraging increased production. Cotton and tobacco exports have declined in importance as world demand for these commodities has fallen off.

The mix of agricultural imports has also changed considerably since 1950. A larger proportion of the value of our agricultural imports now consists of animal products, vegetables and vegetable products, and fruits and fruit products. Coffee, sugar, and complements in general now constitute a much smaller proportion of total agricultural imports. Dairy product imports have increased slightly as a proportion of the total, but dairy imports are severely restricted by tight import controls.

Total and Government Stocks of Agricultural Commodities

Reviewing trends in stocks of agricultural commodities is useful for two purposes: for assessing the need for or consequences of policy for the agricultural sector, and for assessing how well the country can weather periods of production shortfall such as 1988 promises to be. Table 14 provides data on aggregate year-end stocks of the principal agricultural commodities and on year-end stocks of the Commodity Credit Corporation (CCC).

Reserve stocks of commodities are held for a variety of purposes. First, some minimum level of stocks is necessary to keep the "pipelines" full. That is, even if production throughout the year were continuous and smooth, the product would take time moving through the marketing system from farms to processors and grain merchants. Thus processors and grain merchants need to have ready access to some reserve supply in order to

Table 14. Total and Commodity Credit Corporation (CCC) Ending Stocks in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Ending Total Stocks as a Percent of Domestic and Export Use														
Wheat	46.6	118.9	120.6	41.9	54.4	35.1	43.1	44.3	62.7	55.1	55.3	97.2	82.9	45.7
Corn	25.8	42.5	54.8	19.1	14.8	11.0	19.1	36.4	48.6	15.0	23.4	62.2	65.9	52.5
Oats	21.7	23.9	29.7	42.9	63.9	31.2	34.1	28.3	41.6	33.2	35.4	33.8	28.2	28.4
Barley	8.7	10.1	16.3	15.1	20.6	19.5	26.4	27.6	41.0	34.6	48.5	59.6	71.3	70.0
Cotton	15.2	129.0	47.2	134.1	34.5	34.6	22.3	55.8	73.6	22.4	34.7	111.9	35.5	38.9
Grain Sorghum	14.9	34.3	140.7	46.2	10.9	11.1	20.7	46.4	61.4	44.8	35.1	63.4	96.6	86.3
Rice	11.7	71.9	17.7	10.8	22.4	37.4	10.6	32.5	54.0	37.5	52.8	62.1	31.9	20.9
Soybeans	3.3	5.6	4.9	4.3	8.8	15.8	17.4	12.7	15.8	10.8	17.0	25.5	22.5	14.4
Dairy [a]	4.1	7.4	4.4	3.6	5.0	3.3	10.1	13.8	14.8	16.2	12.3	9.6	9.0	5.2
CCC Ending Stocks														
Total Value of CCC Stocks ($mil)	1,926	5,604	6,079	4,110	1,594	402	2,802	3,779	5,507	10,597	6,664	8,309	13,848	15,000
As % of Cash Receipts	6.8	19.0	17.7	10.4	3.2	0.5	2.0	2.7	3.9	7.8	4.7	5.8	10.2	11.0
CCC Stocks as a Percent of Domestic and Export Use														
Wheat	25.7	93.6	91.0	36.3	18.7	0.0	8.8	7.3	7.7	14.8	16.3	28.4	44.9	30.7
Corn	13.9	27.6	40.0	12.0	4.8	0.0	3.5	3.6	5.9	18.4	4.2	6.9	17.1	18.4
Oats	0.9	2.4	1.0	4.7	16.3	3.8	0.6	0.4	0.2	0.2	0.4	0.4	0.8	0.9
Barley	9.4	7.1	12.3	4.5	5.5	0.0	0.9	0.6	1.1	2.0	2.4	9.0	14.0	13.1
Cotton	0.7	71.1	33.6	81.4	17.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0
Grain Sorghum	17.6	19.9	111.6	58.2	19.5	0.0	0.0	0.0	2.0	3.6	0.4	14.3	43.9	51.8
Dairy [a]	1.4	4.5	1.0	0.4	1.8	0.1	5.6	9.8	11.4	12.5	8.7	6.4	6.1	2.0

[a] Milk equivalent of dairy products as a percent of U.S. milk production.

meet day-to-day variations in demand. But production of agricultural commodities is not continuous and smooth throughout the year. Hence, producers and others have the opportunity to speculate by storing corn at harvest time with the hope that when the corn is finally sold they receive a price higher than the price at harvest plus storage costs. Thus, there is a "speculative" demand for commodity storage in addition to the demand associated with keeping the "pipelines" full.

In agriculture, stocks accumulate for two additional reasons. The first reason is food security. Should a production shortfall occur as is likely in 1988, it would be desirable in most people's eyes to have a sizable reserve out of which to eat when current production is exhausted. The disastrous effects of not having a reserve supply are obvious when one considers the plight of the people of the Sahel in Africa. Droughts are not rare events in the United States. The feed grain and soybean producing areas of the country suffered severe droughts in 1970, 1980, and 1983. The wheat and cotton producing regions of the country also experienced severe droughts in 1953 and 1974. (In the fall of 1974, early frosts further damaged the feed grain and soybean crops!) In most of these years, reserve stocks were not as large as they are currently.

A second reason for the accumulation of agricultural stocks is that when farmers produce more than the market will absorb, the federal government in the United States and in several other developed countries stands ready to purchase the surplus and place it (for the most part) in warehouses. If the federal government complicates matters by instituting support prices so high as to encourage surplus production, the necessity of purchasing surpluses and placing them in storage might then be the end result rather than the residual function of Government policy.

The levels of crop storage over the years can be seen from the data in Table 14. In the 1950s and 1960s, we clearly had a surplus of agricultural commodities, encouraged in large part by high price supports for these commodities. The 1970s and early 1980s may be described as periods of shortages as world demand increased and exports approached record levels. Commodity Credit Corporation stocks were minimal or non-existent and, in fact, aggregate stocks probably were approaching minimum "pipeline" levels. By the middle 1980s, however, stocks had again reached burdensome levels. The high year-end stocks of 1987 for feed grains and wheat are nodoubt a welcome sight to consumers, given the severe drought conditions of 1988.

Support Prices, Target Prices, and Loan Rates for Agricultural Commodities

Support prices, target prices, and loan rates for the program commodities as a percent of market prices since 1950 are shown in Table 15. Support prices buttressed with government purchase programs were in effect for the major crops until 1973 and for milk and wool throughout the period. In 1973 support prices for the major crops were replaced with target prices in an effort to shift from a system of supporting farm incomes through commodity prices to a system of direct income support with deficiency payments. Prior to 1973 market prices and support prices differed little, since the government programs then in place directly influenced market prices. The exceptions were prices for those commodities in short supply: sorghum through the early 1970s and wool continuously since 1950.

Target prices instituted for the major crops in 1973, on the other hand, were deliberately set by policy at a level above market prices.

Table 15. Target Prices and Loan Rates for Agricultural Commodities as a Percent of Market Prices in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Target or Support Prices as a Percent of Market Prices														
Wheat	100	105	102	148	212	58	93	103	117	123	129	137	162	172
Corn	97	117	106	108	102	54	87	97	106	89	115	122	155	194
Soybeans	83	92	87	89	79	48	66	83	88	64	86	93	100	99
Cotton	--	--	--	--	--	75	78	106	120	115	141	144	148	136
Sorghum	178	182	181	204	188	99	54	54	65	56	69	73	93	113
Oats	--	--	--	--	--	--	--	--	101	99	96	130	132	102
Barley	92	102	92	94	107	47	79	105	119	105	114	131	161	162
Rice	--	--	--	--	--	--	85	90	130	137	143	177	236	265
Butter	98	99	102	98	101	87	104	102	101	99	96	99	94	97
Cheese	105	106	92	94	95	93	102	101	101	99	97	98	98	101
NonFat-Dry Milk	105	104	102	99	103	97	104	102	101	99	100	98	100	102
Milk, mfg.	97	100	94	97	99	95	109	104	103	104	103	103	101	99
Wool	73	145	148	132	203	161	140	143	200	250	208	273	259	189
Tobacco, Burley	93	79	89	89	95	91	88	91	97	99	93	112	95	94
Tobacco, Flue-Cured	82	92	92	89	93	93	98	95	95	96	94	99	94	91
Loan Rates as a Percent of Market Prices														
Oats	90	102	83	97	102	37	65	66	88	84	78	107	82	60
Wheat	100	105	102	93	94	38	77	87	103	104	97	103	89	89
Corn	97	117	106	91	79	43	83	97	100	83	97	102	98	117
Barley	92	102	92	78	86	37	64	79	95	87	91	105	97	93
Sorghum	178	182	181	168	141	79	46	48	60	52	58	61	59	68
Cotton	76	108	108	138	92	71	65	78	97	83	96	102	100	88
Rye	--	--	102	104	103	38	72	68	91	104	104	106	109	105
Rice	90	97	97	91	94	84	64	67	97	98	96	119	143	152
Peanuts, Quota	99	104	101	98	100	101	91	85	110	111	99	115	106	112
Peanuts, Nonquota	--	--	--	--	--	--	50	46	40	37	33	30	26	28
Honey	59	56	48	63	75	50	82	91	92	91	91	92	94	90

-- Not applicable.

During the period of high export demand, there was little need for farm income support via high target prices and high loan rates because market prices were sufficiently high to yield "acceptable" farm incomes. Thus market prices and target prices were quite close. But by 1982-83 they began to diverge substantially for wheat, corn, cotton, barley, and rice as global demand subsided somewhat and market prices fell accordingly. The divergence for these crops widened through 1987.

Commodity Credit Corporation (CCC) loan rates were also generally close to market prices prior to 1973 except for commodities in short supply, such as sorghum. Since target prices were introduced in 1973, loan rates generally have been kept low (at or below market prices) so as not to distort world prices of the supported crops. Rice and corn constituted major exceptions to this rule, at least during 1985-87.

Sugar policy in the United States is and has been a rather complex story that is best left to other reports. Suffice it to say that U.S. sugar policy in recent years has caused domestic wholesale prices of sugar to be much greater than world prices of sugar (in fact, five times greater in 1985!). This result is effected with high producer price supports, domestic producer quotas, and import quotas allocated to the sugar-producing nations.

Government Cost of Farm Programs and Direct Payments to Farmers

Farm price and income support programs were born at a time when farm incomes were severely depressed. They were intended to buttress farm incomes in addition to ensuring an adequate, uninterrupted food supply. These programs have utilized price support and commodity purchase

Table 16. Government Cost of Farm and Food Programs in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Aggregate Cost of Farm and Related Programs [a]														
Total Cost ($bil)	2.6	2.5	2.9	4.5	5.9	3.0	7.0	8.0	16.3	32.3	12.0	20.5	33.1	34.0
As a Percent of Cash Receipts	9.1	8.5	8.5	11.5	11.6	3.3	5.0	5.6	11.4	23.7	8.4	14.2	24.5	24.9
Per Capita, all U.S. ($)	17	15	16	23	29	14	31	35	70	138	51	86	137	140
Cost of Domestic Food Donation Programs														
Total Cost ($mil)	139	199	249	531	1,216	6,316	12,716	14,904	14,116	15,499	15,430	15,718	16,235	15,028
Per Capita, all U.S. ($)	0.91	1.20	1.38	2.73	5.93	29.24	55.95	64.90	60.85	66.16	65.25	65.84	67.34	61.74
Cost of P.L. 480														
Total Cost ($mil)	--	260	967	1,541	1,056	1,101	1,335	1,333	1,107	1,195	1,377	1,627	960	1,000
Per Capita, all U.S. ($)	--	1.57	5.35	7.93	5.15	5.10	5.87	5.80	4.77	5.10	5.82	6.81	3.98	4.11
Government Cost of Farm and Related Programs by Commodity as a Percent of Total														
Feed Grains	29.5	19.1	31.4	24.5	34.4	8.7	23.2	-1.0	31.9	39.4	5.4	24.3	45.8	52.7
Wheat	20.0	29.5	30.3	23.9	26.4	15.4	21.7	28.6	17.2	21.7	29.2	14.0	13.6	14.0
Cotton	11.6	14.3	9.3	20.9	16.9	8.5	1.0	4.4	7.4	7.8	5.4	7.4	9.5	6.8
Soybeans	-1.2	1.6	-1.7	-0.9	-1.3	0.8	1.0	1.7	1.0	0.7	-4.2	3.6	2.7	-1.1
Tobacco	2.6	6.3	-3.8	5.0	3.7	-4.5	0.3	0.3	0.7	2.7	2.9	1.8	-0.2	-0.0
Rice	0.4	4.2	2.3	2.1	2.2	5.1	1.3	2.3	1.1	3.8	4.5	1.8	2.8	3.0
Dairy	7.3	2.3	5.9	4.8	3.3	16.3	19.3	39.8	31.3	18.8	36.2	32.3	16.8	13.7
Government Cost of Farm and Related Programs by Commodity as a Percent of Cash Receipts														
Feed Grains	35.7	18.8	30.5	29.9	39.6	2.1	8.9	-0.5	29.9	81.9	4.1	22.2	89.2	137.1
Wheat	25.5	40.0	37.1	60.6	86.1	6.0	17.1	23.2	28.4	79.9	41.3	36.2	86.9	88.9
Cotton	12.4	14.0	11.4	40.5	79.4	10.9	1.6	8.8	27.1	67.6	17.6	41.2	88.9	57.4
Soybeans [b]	-3.3	3.6	-3.6	-1.9	-2.1	0.3	0.5	1.0	1.2	1.6	-3.6	5.9	8.4	-3.5
Tobacco	6.4	12.9	-9.6	19.1	15.8	-6.3	0.8	0.8	3.2	31.8	12.4	13.4	-4.1	-0.7
Rice	5.1	39.4	27.4	25.5	29.6	14.1	5.9	10.4	12.0	137.9	51.9	33.5	126.3	203.3
Dairy	5.1	1.4	3.6	4.3	3.0	4.9	8.3	17.6	28.0	32.4	24.1	36.7	31.1	26.2

[a] One-half of domestic food donation programs and one-half of P.L. 480 charged as a cost of farm and related programs.
[b] Percent of cash receipts from oil crops.

programs, nonrecourse loan programs, supply control programs, direct income payment programs, and demand expansion programs designed to distribute surplus agricultural commodities to the needy at home and abroad. The data in Table 16 show the costs of these programs to the federal government over the 1950-87 period in the aggregate, by major commodities, and per capita.[7/] These data show that government costs of the farm programs were quite high for the major commodities (wheat, feed grains, and cotton) during the 1950s and 1960s, fairly low for all commodities during the late 1970s and early 1980s when demand was high and surpluses had diminished, and on an upward path again following 1982 for the major commodities and dairy. It should be noted that in 1987 cash receipts from feed grains dropped substantially more than did government costs of the feed grain program rise. Thus the large percentage shown for feed grains in the lower portion of Table 16 is more a function of market conditions than of changes in government programs.

The domestic food donation programs have also become more costly in the 1980s, but the foreign food aid program (P.L. 480) has been maintained at levels comparable to those of the 1960s and 1970s. Both food aid programs are currently supported on their own merits rather than as mechanisms to support farm incomes even though they were originally designed to help support farm incomes by expanding food demand.

7/ These costs were estimated as explained in W. W. Cochrane and M. E. Ryan. American Farm Policy, 1948-73. University of Minnesota Press, 1976. They include losses on CCC stocks; storage, handling, transportation, interest, and other operating expenses of CCC; direct payments to farmers including land retirement payments; and one-half of the cost of the domestic food donation, P.L. 480, school milk, and school lunch programs. The estimates for 1974 through 1987 were generated by the author.

Table 17 shows the distribution of direct payments to farmers by sales class. Direct payments to farmers include deficiency payments made in cash, cash or in-kind payments made to farmers for reducing or diverting cropland acres, disaster payments, and miscellaneous payments such as wool price support (incentive) payments and dairy diversion and buyout payments. Not included are the monetary benefits farmers receive from the nonrecourse loan program of the Commodity Credit Corporation.

The data shown in Table 17 suggest that the distribution of direct government payments to farmers is far from even across different farm sizes when farm size is measured by annual gross sales. Further, the distribution appears to have grown progressively more uneven over the last two-and-one-half decades. In 1960, the proportion of direct government payments was relatively evenly distributed among the six different size groups for which data are available. In 1987, on the other hand, almost one-third of the direct payments went to those farms with annual gross sales of between $100,000 and $249,999, whereas only 3.9 percent of the payments went to those farms with annual gross sales of $9,999 or less.

This seemingly unequal distribution of payments in recent years has resulted in much criticism of farm policy. We should exercise caution, however, before becoming too critical. First, comparing the distribution of payments among farm sizes as measured by annual gross sales and over time is hazardous at best, as we saw in examining the distribution of farms by sales class. Second, the skewed distribution of direct government payments toward the larger producers (as measured by annual gross sales) is hardly surprising, since payment rates are based on volume produced. This point can be clearly observed by the high positive correlation between the distribution of government payments shown in

Table 17. Direct Government Payments to Farmers by Sales Class in the United States, 1950-1987.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Percentage Distribution of Government Payments to Farmers by Sales Class														
Under $5,000	na	na	25.6	20.1	15.6	9.4	3.7	3.4	3.3	1.4	0.9	1.0	1.6	1.6
$5,000-$9,999	na	na	20.5	16.1	10.5	6.7	4.0	3.8	3.6	0.9	1.2	1.3	1.8	2.3
$10,000-19,999	na	na	22.7	25.5	18.1	10.1	4.6	4.4	4.2	3.1	2.8	2.7	4.0	4.0
$20,000-$39,999	na	na	15.8	19.8	22.2	17.4	11.4	10.6	10.2	6.3	6.8	9.0	10.5	12.0
$40,000-$99,999	na	na	11.0	12.6	19.1	28.5	32.2	31.0	30.5	21.5	22.5	24.6	25.8	26.6
$100,000-$249,999 [a]	na	na	4.3	6.0	7.1	13.0	21.9	22.8	28.7	32.6	37.0	33.0	32.5	32.3
$250,000-$499,999	na	na	na	na	3.7	7.8	15.2	16.4	11.1	19.0	16.9	17.2	14.8	11.4
$500,000 and over	na	na	na	na	3.2	7.1	7.2	7.7	8.4	15.2	11.8	11.2	8.8	8.4
Government Payments per Farm as a Percent of Gross Farm Income per Farm by Sales Class														
Under $5,000	na	na	2.9	9.4	9.7	1.5	0.7	1.0	1.5	1.8	1.0	1.1	2.7	3.6
$5,000-$9,999	na	na	2.5	8.4	9.7	1.6	1.2	1.7	3.0	2.1	2.5	2.6	5.8	10.2
$10,000-19,999	na	na	2.0	7.8	9.4	1.4	1.0	1.4	2.5	5.3	4.3	3.9	9.5	13.2
$20,000-$39,999	na	na	1.6	5.5	7.5	1.3	1.4	2.1	3.6	6.3	6.2	7.5	14.2	22.9
$40,000-$99,999	na	na	1.4	3.8	5.8	1.0	1.5	2.2	3.9	7.5	7.2	7.1	12.9	18.3
$100,000-$249,999 [a]	na	na	0.5	1.4	4.4	0.7	1.0	1.5	2.6	7.7	7.7	6.2	10.2	14.2
$250,000-$499,999	na	na	na	na	3.0	0.5	0.7	1.0	1.6	7.2	5.5	4.8	6.7	7.0
$500,000 and over	na	na	na	na	1.5	0.3	0.2	0.3	0.6	3.0	2.0	1.8	2.1	2.8

[a] This sales category is $100,000 and over in 1960 and 1965.
na - Data not available.

Table 17 and the distribution of gross farm income by farm size shown in Table 2.

A more appropriate assessment of the equality or inequality of payment distribution is available from an examination of the distribution of government payments per farm as a percent of gross income (sales) per farm. This distribution, shown in the lower half of Table 17, gives a realistic picture of the correlation between direct payments and the earning capacity of the farm. Clearly some inequality still exists, but this comparison suggests that the inequality may not be as severe as many perceive it to be.

Those who see too much inequity in the large government payments made to operators of medium-sized to large farms have argued for unconditional limits on the size of government payments on the basis that such farm operators have little need for income support over some minimum level. Accordingly, payment limits of $55,000 were introduced in 1970; $20,000 for wheat, feed grains, and cotton combined in 1973; $55,000 for rice in 1975; $52,250 for rice in 1978; $50,000 for rice in 1979; $40,000 for wheat, feed grains, and cotton in 1978; $45,000 for wheat, feed grains, and cotton in 1979; and $50,000 for all commodities since 1980. In addition, 1981 and 1985 legislation called for disaster payment limits of $100,000.

Those who argue for no payment limits or very high payment limits counter that since 69.1 percent of the output by value is produced by the largest 13.8 percent of the producers (e.g., in 1987, Table 2), payment limits will not encourage those farmers who produce most of the output to participate in current government programs.

Consumer Expenditures and Per Capita Consumption

The proportion of personal expenditures going to food has declined continuously over the 38-year period of this study (Table 18). American consumers spent 17.4 percent of their personal consumption expenditures on food in 1987--the lowest of any country in the world.[8/] The proportion spent on poultry and egg products, dairy products, and grain mill products has declined slightly, while the proportion spent on fruits and vegetables has increased slightly. The proportion spent on meat products in total has changed very little. The proportion spent on eating away from home has increased considerably since data on this proportion has become available.

Per capita consumption of selected food products is shown in Table 18. Changes in per capita consumption over time are due to several factors including changing product prices, changing income levels of consumers, and changing consumer tastes and preferences. In recent years, for example, U.S. consumers have been increasingly concerned about cholesterol levels, affecting the consumption of animal products in particular. The data shown in Table 18 refer to the aggregate U.S. population rather than to a specific population group. The changing age distribution of our population (i.e., the aging of the population) that we have witnessed in the last twenty years has also had a marked effect on aggregate per capita consumption. All these factors must be considered when assessing trends in per capita food consumption.

8/ See, for example, Penni Korb. "Comparing International Food Expenditures." National Food Review. Economic Research Service. NFR-38. Fall 1987.

Table 18. Consumer Expenditures and Per Capita Consumption of Selected Commodities in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Personal Consumer Expenditures														
Per Capita Total Exp. ($)	1,262	1,554	1,830	2,268	3,121	4,689	7,624	8,340	8,839	9,538	10,268	11,014	11,610	12,193
Per Capita Food Exp. ($)	354	413	458	520	693	1,013	1,536	1,640	1,719	1,801	1,902	1,980	2,065	2,119
Percent Spent on Food	28.1	26.6	25.0	22.9	22.2	21.6	20.1	19.7	19.4	18.9	18.5	18.0	17.8	17.4
Percent Spent Away from Home	na	na	na	18.8	19.5	20.9	22.7	22.6	22.9	24.3	24.7	25.6	24.9	24.0
Percent of Food Expenditures for Domestically Produced Food Spent on:														
Meat Products	30.3	27.9	27.8	27.6	31.0	28.8	30.8	29.9	29.7	29.9	30.0	29.9	30.0	30.0
Poultry and Eggs	9.2	8.6	7.6	7.7	8.4	6.4	6.9	6.9	6.8	6.9	7.0	7.0	7.0	7.0
Dairy Products	18.5	19.4	18.4	16.1	15.4	14.0	14.3	14.4	14.1	14.3	14.3	14.3	14.3	14.3
Cereal and Bakery Products	10.9	10.3	10.4	10.1	9.2	10.9	10.1	10.1	10.2	9.9	10.0	10.0	10.0	10.0
Grain Mill Products	4.3	4.0	3.9	3.8	3.3	3.6	3.2	3.1	3.0	2.9	3.0	3.0	3.0	3.0
Fruits and Vegetables	18.0	20.9	22.0	21.9	20.8	21.3	20.3	21.0	21.4	21.1	21.1	21.2	21.2	21.2
Per Capita Consumption (retail weight)														
Animal Products (lbs)	645	659	641	635	613	585	584	579	570	583	580	585	585	580
Beef (lbs)	50	64	64	74	84	88	76	77	77	78	78	79	78	79
Poultry Meat (lbs)	25	27	34	41	49	49	60	62	64	65	67	70	72	73
Eggs (lbs)	49	47	42	40	39	35	34	34	34	33	33	32	32	32
Dairy Products (lbs)	406	407	384	373	337	324	307	304	302	304	306	305	305	306
Cheese (excl cottage) (lbs)	8	8	8	10	12	14	18	18	20	21	21	23	23	23
Crop Products (lbs)	860	820	800	774	783	786	816	815	817	834	830	825	825	830
Fresh Fruits (lbs)	107	95	89	79	78	82	86	83	84	88	88	86	92	91
Fresh Vegetables (lbs)	na	na	na	62	64	63	73	71	74	74	79	79	79	80
Coffee (lbs)	14	12	12	11	10	9	8	8	8	8	8	7	6	7
Sugar (lbs)	101	96	98	97	102	89	84	79	74	71	67	63	60	60

na - Data not available.

Per capita consumption of animal products in total declined significantly through the 1970s, then leveled off or increased slightly. Total per capita consumption of dairy products has followed this same trend quite closely. Per capita cheese consumption, though, has been a bright spot for the U.S. dairy industry. Per capita beef consumption increased until the mid 1970s, then declined. Per capita consumption of poultry meat, particularly turkey meat, has increased markedly throughout the period. Per capita fruit consumption declined through the 1960s, then leveled off. Per capita consumption of fresh fruit has increased slightly in recent years. Per capita vegetable consumption has followed a pattern similar to that of fruit consumption. Per capita consumption of fresh vegetables has increased steadily since the mid 1970s.

Food Marketing Costs

Farmers' share of the consumer's food dollar has declined steadily and in every major product category except processed fruits and vegetables over the 1950-87 period (Table 19). This decline is hardly to be decried, as it simply means that consumers are demanding and processors and retailers are supplying additional services in the form of more convenient packaging and other services. In large part, this demand can be attributed to the fact that Americans now have less time (or wish to take less time) to prepare food in the home, so they are interested in purchasing as many additional services as possible along with the basic food product.

The components of the total food marketing bill have changed very little over the 1950-87 period. Labor is by far the most significant

Table 19. Farmers' Share of Retail Food Dollar and the Food Marketing Bill in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Farmers' Share of Retail Value (percent)														
Market Basket of Food Products	47	41	38	38	37	40	37	35	34	33	34	31	30	29
Meat Products	65	53	57	59	53	57	51	49	50	48	49	45	45	45
Beef	74	66	66	66	63	64	61	58	58	57	58	55	54	57
Pork	64	54	55	62	51	59	45	46	50	45	48	44	46	44
Poultry Products	67	65	59	57	46	59	55	52	51	53	56	53	54	44
Eggs	67	68	65	62	63	66	64	66	63	65	65	61	61	54
Fats and Oils	38	33	28	31	30	34	29	27	22	27	31	26	19	18
Fresh Fruit	40	36	37	31	28	30	26	26	27	23	28	24	23	20
Fresh Vegetables	37	35	34	35	32	35	27	31	29	29	29	26	24	27
Processed Fruits and Vegetables	18	18	18	21	19	21	23	23	20	19	20	22	19	20
Bakery Products	26	23	16	17	16	19	14	13	11	11	11	10	8	7
Components of Food Marketing Bill as a Percent of Total														
Labor	46.9	45.6	42.3	43.1	42.9	43.4	44.6	44.5	44.9	44.7	45.3	45.4	45.9	46.2
Fuel and Electricity	na	na	na	na	2.9	4.1	5.1	5.0	5.3	5.2	5.3	5.2	4.9	4.8
Transportation	10.4	9.9	9.7	7.8	6.9	7.5	7.1	7.0	6.8	6.7	6.6	6.3	6.2	6.1
Profits before Taxes	6.2	5.2	4.8	5.6	4.8	6.4	6.0	5.9	6.0	6.4	6.6	6.6	3.4	3.5
Packaging	na	na	na	na	10.9	11.9	11.5	11.1	10.8	10.6	10.9	10.5	10.2	10.4

na - Data not available.

component of this bill, followed at some distance by packaging and transportation. Profits of food processors and merchants are often a subject for concern. The data in Table 19 suggest that profits are not an excessive portion of the total marketing bill, nor have they been increasing. In fact, profits appear to have fallen significantly in 1986-87.

Agricultural Cooperatives

One of the more important institutions available to farmers is the agricultural cooperative. The data in Table 20 indicate that agricultural cooperatives (both marketing and farm supply cooperatives) are fairly numerous, that many farmers belong to at least one, and that these institutions engage in the marketing of a sizable portion of farm produce (over one-third of cash farm receipts since 1975) and supply many of the inputs farmers require (again, over one-third by value since 1980).[9/] Interestingly, the number of cooperatives and cooperative memberships per farm reached a peak in the mid and late 1970s and then started a slight downward trend. There were several cooperative consolidations and cooperative failures during this period, some of the latter due to managerial difficulties rather than economic stress. It also appears that some farmers chose not to remain as cooperative members when financial pressures of the 1980s intensified. However, total cooperative share of the farm marketing and farm supply business has generally been maintained throughout the 1980s.

9/ The data in Table 20 are from U.S. Department of Agriculture. Cooperative Historical Statistics. Agricultural Cooperative Service. Cooperative Information Report 1, Section 26. October 1987.

Table 20. Agricultural Cooperatives, Their Membership, and Their Volume of Business in the United States, 1950-87.

	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Number of Cooperatives per 1000 Farms														
Marketing Cooperatives	1.23	1.36	1.47	1.58	1.64	1.89	1.57	1.54	1.55	1.54	1.51	1.51	1.47	na
Farm Supply Cooperatives	0.55	0.72	0.83	0.92	0.94	1.08	0.97	0.97	0.96	0.93	0.92	0.89	0.89	na
Cooperative Membership per Farm														
Marketing Cooperatives	0.72	0.91	0.91	1.13	1.05	1.24	1.04	1.01	1.02	0.97	1.00	0.97	0.91	na
Farm Supply Cooperatives	0.44	0.71	0.91	0.97	1.09	1.18	1.15	1.17	1.11	1.08	1.03	1.05	1.01	na
Volume of Cooperative Business as a Percent of Farm Marketings or Total Purchased Inputs														
Marketing Coops	17.0	22.1	23.8	25.5	26.0	31.1	31.4	33.0	30.0	30.0	30.0	28.0	na	na
Supply Coops	14.1	15.3	15.3	16.0	15.6	18.0	19.8	20.0	27.0	27.0	27.0	26.0	na	na

na - Data not available.

Food Processing Industries and Food Retailing

Tables 21 and 22 contain information on the food processing and retailing industries in the United States. In general, we see that firms in these industries are getting fewer in number and larger in size. In most cases, productivity of these firms is increasing, although in some cases productivity growth appears to be sluggish, particularly in recent years.

In retail food stores and eating places, some different trends are evident (Table 22). Retail food stores have also been declining in number and getting larger, but real sales per worker have fallen. The number of eating places has increased in response to consumers' increased demand for away-from-home eating. But again, real sales per worker have fallen.

Summary

Significant changes have occurred in the U.S. agricultural and food system since 1950. There are fewer farms, fewer farm workers, and fewer farm people. Capital has indeed substituted for labor, but capital use as a percentage of annual cash receipts from farm marketings has also declined. Since 1950 farms have, on average, doubled in size as measured by acres. But sales volume on all U.S. farms would have increased since 1950 even without an increase in acres or number of animals simply because of increases in nominal prices received, labor productivity, and animal and crop yields.

Incomes of farm families appear now to be more nearly in line with incomes of nonfarm families than in years past. Some of this apparent

Table 21. Economic Activity in the United States Food Processing Industries, 1949-82 [a].

	1950	1954	1958	1963	1967	1972	1977	1982
Food and Kindred Products Industry (SIC 20)								
Number of Establishments (thou)	na	42.4	41.6	37.5	32.5	28.2	26.3	22.1
Number of Workers (thou)	na	1,138	1,138	1,098	1,122	1,085	1,066	1,051
Real Value Added/Estab ($thou)	na	1,202	1,418	1,795	2,280	2,718	3,182	3,998
Real Value Added/Worker ($thou)	na	45	52	61	66	71	78	84
Real Value Added per Capita ($)	na	313	337	356	373	365	379	381
Workers/Establishment	na	27	27	29	34	39	41	47
Workers as % of U.S. Employment	na	19	18	16	15	13	12	11
Meat Industry (SIC 201)								
Number of Establishments (thou)	4.0	5.0	5.5	5.3	4.9	4.4	4.5	3.6
Number of Workers (thou)	221	243	243	239	249	251	254	265
Real Value Added/Estab ($thou)	1,348	1,471	1,522	1,679	2,013	2,404	2,434	3,037
Real Value Added/Worker ($thou)	24	30	35	37	40	43	43	42
Real Value Added per Capita ($)	35	45	48	47	50	51	50	47
Workers/Establishment	56	49	44	45	51	56	56	73
Workers as % of U.S. Employment	3.7	4.0	3.9	3.5	3.3	3.1	2.8	2.7
Dairy Industry (SIC 202)								
Number of Establishments (thou)	na	11.5	9.9	7.9	6.2	4.6	3.7	2.7
Number of Workers (thou)	na	153	142	117	107	93	87	83
Real Value Added/Estab ($thou)	na	746	977	1,247	1,560	1,899	2,317	3,098
Real Value Added/Worker ($thou)	na	56	68	84	90	94	99	101
Real Value Added per Capita ($)	na	53	55	52	49	42	39	36
Workers/Establishment	na	13	14	15	17	20	23	31
Workers as % of U.S. Employment	na	2.5	2.3	1.7	1.4	1.1	0.9	0.8
Preserved Fruits and Vegetables (SIC 203)								
Number of Establishments (thou)	3.8	3.5	3.7	4.0	3.5	2.6	2.4	2.1
Number of Workers (thou)	181	175	193	212	227	199	198	182
Real Value Added/Estab ($thou)	1,002	1,408	1,728	2,161	2,833	3,797	4,836	5,888
Real Value Added/Worker ($thou)	21	28	33	40	44	49	58	68
Real Value Added per Capita ($)	25	30	36	45	50	46	52	53
Workers/Establishment	47	50	52	54	64	78	83	87
Workers as % of U.S. Employment	3.1	2.9	3.1	3.1	3.0	2.4	2.1	1.8

[a] SIC=Standard Industrial Code as used by the Bureau of the Census. "Real" value added here refers to value added by manufacture deflated by the CPI (1967=100).

na - Data not available.

Table 21. (Continued)

	1950	1954	1958	1963	1967	1972	1977	1982
Grain Mill Products Industry (SIC 204)								
Number of Establishments (thou)	4.2	3.4	3.5	3.6	3.2	3.1	3.0	2.7
Number of Workers (thou)	86	79	84	79	78	79	80	75
Real Value Added/Estab ($thou)	996	1,381	1,793	1,972	2,507	2,583	3,311	3,764
Real Value Added/Worker ($thou)	49	58	75	89	103	101	126	139
Real Value Added per Capita ($)	28	28	36	37	40	38	46	45
Workers/Establishment	20	24	24	22	24	25	26	27
Workers as % of U.S. Employment	1.5	1.3	1.3	1.2	1.0	1.0	0.9	0.7
Bakery Industry (SIC 205)								
Number of Establishments (thou)	7.1	6.4	6.3	5.4	4.4	3.6	3.4	2.7
Number of Workers (thou)	188	179	180	164	160	143	131	124
Real Value Added/Estab ($thou)	802	1,172	1,404	1,743	2,217	2,686	3,126	3,999
Real Value Added/Worker ($thou)	30	42	49	57	61	68	81	86
Real Value Added per Capita ($)	38	46	51	49	49	46	48	46
Workers/Establishment	26	28	28	31	36	39	39	47
Workers as % of U.S. Employment	3.2	3.0	2.8	2.4	2.1	1.7	1.4	1.2
Sugar Industry (SIC 206)								
Number of Establishments (thou)	1.9	1.6	1.6	1.4	1.4	1.2	1.2	1.0
Number of Workers (thou)	109	91	88	89	94	87	105	77
Real Value Added/Estab ($thou)	1,991	1,979	2,303	3,346	3,722	4,258	5,104	6,035
Real Value Added/Worker ($thou)	35	35	42	53	57	61	58	81
Real Value Added per Capita ($)	25	20	21	25	27	25	28	27
Workers/Establishment	56	56	55	63	66	69	88	75
Workers as % of U.S. Employment	1.8	1.5	1.4	1.3	1.3	1.1	1.1	0.8
Beverages Industry (SIC 207)								
Number of Establishments (thou)	6.8	5.4	5.6	5.0	4.4	3.6	3.1	2.6
Number of Workers (thou)	139	119	115	109	114	107	99	95
Real Value Added/Estab ($thou)	1,146	1,580	1,718	2,291	3,049	3,969	4,724	6,457
Real Value Added/Worker ($thou)	56	72	83	106	118	135	148	175
Real Value Added per Capita ($)	51	52	55	61	67	69	67	72
Workers/Establishment	21	22	21	22	26	29	32	37
Workers as % of U.S. Employment	2.4	2.0	1.8	1.6	1.5	1.3	1.1	1.0

[a] SIC=Standard Industrial Code as used by the Bureau of the Census. "Real" value added here refers to value added by manufacture deflated by the CPI (1967=100).

Table 22. Economic Activity in United States Food Retailing and Eating Places, 1955-82 [a].

	1954	1958	1963	1967	1972	1977	1982
Retail Food Stores							
Number of Establishments (thou)	384.6	355.5	319.4	294.2	267.4	252.0	176.2
Population/Estab	424	492	592	675	785	874	1317
Real Sales/Estab ($thou)	128	159	195	239	301	345	472
Real Sales/Worker ($thou)	48	48	49	49	47	44	35
Real Sales/Population($)	303	324	329	353	383	395	359
Workers/Establishment	2.7	3.3	4.0	4.9	6.4	7.8	13.3
Workers as % of U.S. Employment	1.7	1.9	1.9	1.9	2.1	2.1	2.4
Eating Places							
Number of Establishments (thou)	169.9	229.8	223.9	236.6	253.1	274.3	319.9
Population/Estab	960	761	845	840	829	803	725
Real Sales/Estab ($thou)	59	55	68	80	96	112	110
Real Sales/Worker ($thou)	10	10	10	11	10	9	8
Real Sales/Population($)	62	73	80	95	116	139	152
Workers/Establishment	5.9	5.7	6.7	7.3	9.2	12.5	14.6
Workers as % of U.S. Employment	1.7	2.1	2.2	2.3	2.8	3.7	4.7

[a] "Real" value added and "Real" sales refers to value added by manufacture or retail sales deflated by the CPI (1967=100).

equality is due to the farm programs Congress has enacted. But for a strong majority of farm families, the apparent equality is due to the substantial off-farm earnings that farm families now have; they no longer depend primarily on farming for their livelihood. Hence, developmental or rural industrial policy is now probably more important to many farm families than are traditional farm price and income policy. The distribution of direct government payments to farmers is somewhat skewed in favor of the larger farmers. This is as would be expected since the size of these payments tends to be a function of production volume. Many argue that this is the way it must be if we are to encourage operators of the larger farms who produce most of the farm output to participate in the government programs Congress enacts. Nevertheless, the larger farmers are less in need of government income support since most of their farms are large enough to provide a reasonable family income.

There has been some decline in the total acreage farmed, but little change of significance in the mix of crops harvested or in the percentage of total cash receipts derived from the different farm enterprises. However, there has been considerable change in the mix of inputs used by the farming sector. Interest and depreciation now constitute a higher proportion of total production expenses, and purchased inputs are now more important than farm-produced inputs. Farm debt has increased substantially so that farmers, particularly the larger farmers, are now much more vulnerable to high interest rates and short-term erosion of asset values.

Real prices received by farmers have declined significantly and for all commodities. Real prices paid by farmers, however, have changed very little since 1950. Farmers have been able to survive this situation

fairly well, though, given the tremendous increases in productivity brought about by the greater use of machinery, fertilizers, and other chemicals, and given the phenomenal increases in crop and animal yields. Relative prices of farm inputs have a considerable impact on farmers' use of different inputs and, therefore, on the substitutability of inputs. Further changes in these relative prices could significantly affect the future structure of the farming sector.

Prices received by farmers for almost all farm commodities are quite variable, as one would expect in an industry where weather, in both the United States and world-wide, plays such a crucial role. Nevertheless, prices of the commodities receiving legislative support are no more variable than prices of the farm commodities receiving no legislative support. Furthermore, a number of nonagricultural commodities which have quite variable prices. Hence, justifying farm price and income support on the basis that farm prices vary considerably is questionable.

Agricultural exports, both absolutely and as a percentage of cash receipts from farming, reached a peak in the early 1980s, then diminished as the value of the U.S. dollar strengthened and/or as other nations began satisfying more of their demand with local production. Imports of agricultural products have also increased, but the agricultural trade balance is still positive. The mix of both agricultural exports and agricultural imports has changed substantially since 1950. Oilseed products now comprise over twenty percent of the value of agricultural exports. Cotton and tobacco exports have become minor export commodities. On the import side, fruits and vegetables have become more important, while coffee and sugar have become less important.

Government price and income policy for agriculture has led to considerable cost to the U.S. Treasury, particularly during periods of surplus production. Treasury costs in 1986 exceeded the value of cash receipts for the major program commodities: feed grains, wheat, rice, and cotton! Treasury costs for dairy were more modest, but even here they amounted to nearly one-third of cash receipts. Domestic and foreign food-donation programs were also fairly costly, but these programs would probably exist even if farm price and income programs were phased out.

Agricultural cooperatives continue to be significant in assisting farmers in marketing their produce and purchasing their inputs. Some cooperative restructuring has taken place in the 1980s, and cooperative membership per farm has declined slightly from the peak of the mid 1970s. Cooperatives' share of the total business volume, however, has been maintained throughout this period.

The number of establishments in the food-processing industries has been declining, and firms in these industries have been getting larger. This situation is significant to farmers, since it means fewer handlers to which farmers can sell their produce. Furthermore, as food-processing establishments get larger, their owners seek farm products from areas that can supply the volume needed to sustain their size of business. In turn, local farm production is often overlooked, not because it cannot be produced as efficiently as in other regions, but simply because it is not produced in the volume needed.